

OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

ANNUAL WATER MANAGEMENT PROGRAM

REVIEW AND APPROVAL

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OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

(OTTAWA NWR, CEDAR POINT NWR, DARBY DIVISION, NAVARRE DIVISION)

OAK HARBOR, OHIO

1990 ANNUAL WATER MANAGEMENT PROGRAM

NATIONAL WILDLIFE REFUGE SYSTEM  
FISH AND WILDLIFE SERVICE  
U.S. DEPARTMENT OF THE INTERIOR



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## 1990 WATER MANAGEMENT PLAN

This annual water management program provides guidelines for water levels during a year of major dike renovation and continued warm temperatures.

It is important to note that most of Ottawa's management capabilities revolve around gravity drainage. In the mid to late 1970's, energy conservation was a factor in the design of water control structures. Dual flap gates on screw gates that faced in opposite directions were installed. Gravity was all the energy needed and the system worked well during those years. The key was to have a water source that periodically fluctuated and wind tides on Lake Erie cooperated with each blow from the southwest and northeast.

With record high water levels set in 1985, 1986 and early 1987, gravity control structures were no longer adequate. High water levels in pools could not be relieved without a major cost in money and human effort to pump it out with portable Crisafulli pumps. Severe erosion took place on all unprotected dikes. Defects in dikes caused by woodchuck and muskrat became evident. Carp find these dike leaks and can wallow out several feet of dike. Faulty water control structures became more serious as the pressure from high water tested their utility. Hundreds of acres of emergent vegetation drowned due to the inability to gravity drain in the high water years. Decreased water levels in mid 1987 permitted adequate drainage to relieve pressure on the dikes.

Since 1989 new pumps were put in place to enable the manager to manipulate water levels without having to rely on gravity drainage. Units which will be affected by installation of pumps are those units directly influenced; MS 7a, MS 8b, farm field south of Velar Road, Cedar Point Pool 1, and units indirectly influenced; Pool 2a, 2b, 2c, MS 7b, MS 8a, Darby Pool 2 and 3, Cedar Point Pool 2. This will greatly enhance the program.

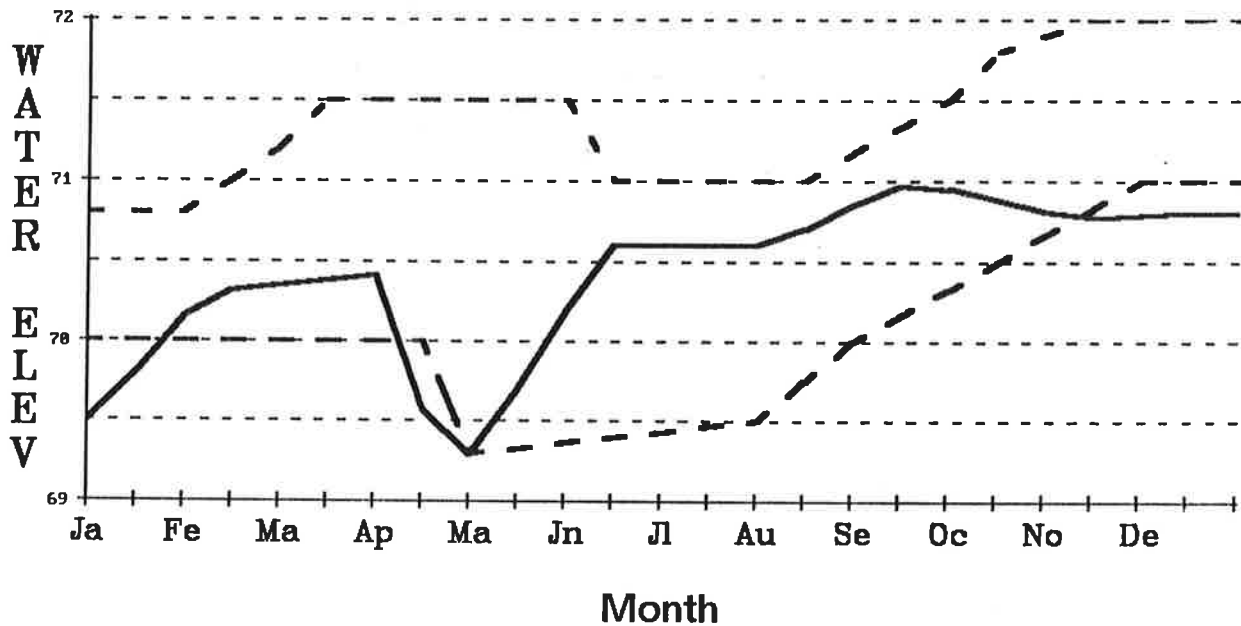
In 1989, many areas were in drawdown to facilitate renovation of damaged dikes, water control structures (WCS) and pump stations. Lake water levels were normal for the spring but during the fall water levels dropped making it difficult to manipulate the water.

The renovation of facilities continues with the 5.2 million dollars appropriated by Congress for flood damage. This year's water management program will revolve around construction in MS 7a, MS 7b, Mini Marsh and completion of construction at Cedar Point Pool 1, Darby Pools 2 and 3.

1. Unit Pool 1
2. Acres 275
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 570.5
5. Water Elev. with 50% bottom exposed - 569
- 90% bottom exposed -

### POOL 1

— Actual  
 -- Planned  
 - - 90 Plan



7. Vegetation: As of August 29

Species	1987	1988	1989
<u>Open Water</u>	<u>60</u>	<u>5</u>	<u>30</u>
<u>Cattail</u>	<u>15</u>	<u>15</u>	<u>25</u>
<u>Aquatic Smartweed</u>	<u>10</u>	<u>5</u>	<u>10</u>
<u>Smartweed/Nutsedge</u>	<u>5</u>	<u>65</u>	<u>20</u>
<u>Other</u>	<u>10</u>	<u>10</u>	<u>5</u>
<u>Willow/Mallow</u>			<u>10</u>

8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>50,000</u>	<u>93,700</u>	<u>80,000</u>
<u>Geese</u>	<u>10,000</u>	<u>44,000</u>	<u>15,500</u>
<u>GBH</u>	<u>2,500</u>	<u>3,300</u>	<u>3,000</u>

9. Purple Loosestrife: Only small plants found around perimeter. Loosestrife was not observed in the interior sections of the pool.

## Pool 1

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels were at their minimum level (leaving some areas dry while others had two to three inches of water) to accommodate completion of the construction. Construction was completed in August then water was gradually added. Levels going into the winter were as planned.

#### Results:

Submergent aquatics began to grow in the areas where water was standing. Other areas where, due to construction of the dikes, soil was disturbed were covered with smartweed. These conditions attracted shorebirds, geese and ducks. Purple loosestrife was not observed in the pool. The 4-6 inches of water in bay areas attracted average numbers of migrating waterfowl in the fall. Peak populations in the unit reached 2,000 birds.

#### Facilities:

The construction contract, which was awarded to the George Gradel Co. in March of 1988 to reconstruct the north and south dikes and replace the silted water control structure (WCS) on the southeast corner, was completed in August of 1989.

#### Costs:

Final payments for the Pool 1 contract totalled 680,000. Electrical hook up for the Headquarters pump cost \$200.

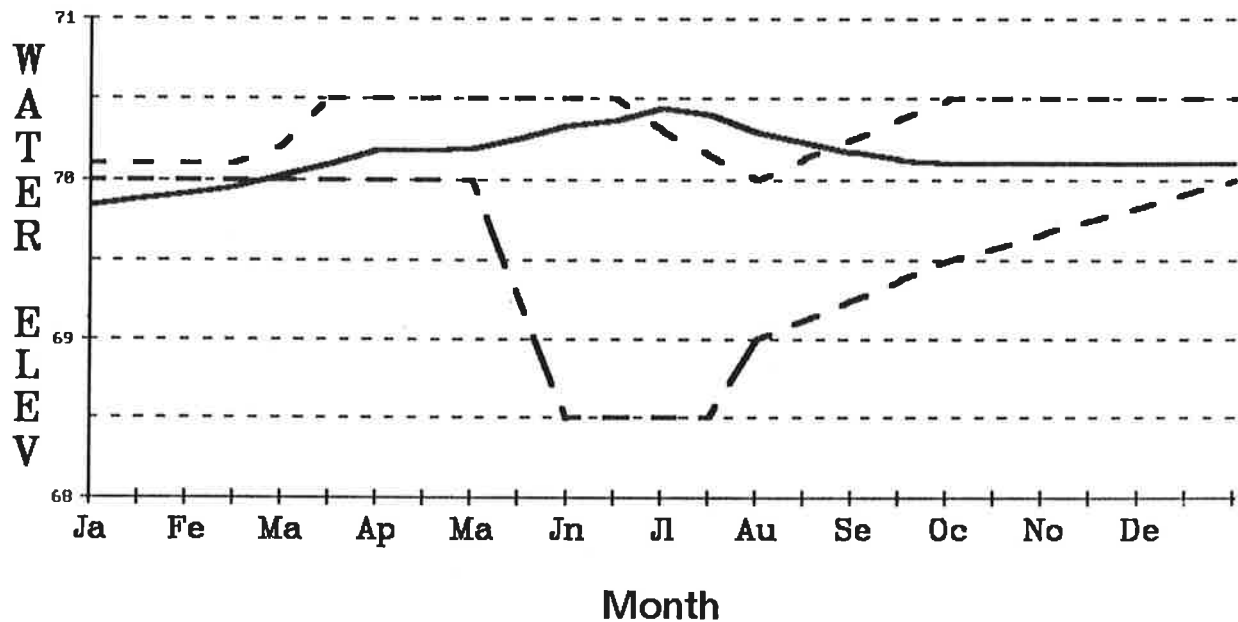
### B.2 Objectives of the 1990 Proposed Water Levels

Gradual increase in pool water level after nesting to increase invertebrates, and submergents for fall migration use and to return the unit to a permanent marsh.

1. Unit Pool 2A
2. Acres 70
3. Maximum elevation permissible 572
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 568
- 90% bottom exposed -

### POOL 2A

— Actual  
 -- Planned  
 - - 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Open Water</u>	<u>25</u>	<u>10</u>	<u>40</u>
<u>Mixed Forbes/Other</u>	<u>40</u>	<u>35</u>	<u>25</u>
<u>Smartweed/Velvet Leaf</u>	<u>10</u>	<u>45</u>	<u>5</u>
<u>Aquatic Smartweed</u>	<u>0</u>	<u>0</u>	<u>15</u>
<u>Mudflats/Bidens</u>	<u>25</u>	<u>10</u>	<u>5</u>
<u>Willow/Cottonwood</u>	<u>        </u>	<u>        </u>	<u>10</u>

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>40,000</u>	<u>51,300</u>	<u>41,900</u>
<u>Geese</u>	<u>20,000</u>	<u>39,800</u>	<u>47,400</u>
<u>GBH</u>	<u>1,000</u>	<u>1,000</u>	<u>800</u>

9. Purple Loosestrife: Small clusters of plants along the north dike.

## Pool 2A

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels were above normal. A mid summer drawdown was not completed. Water levels remained constant through out the summer.

#### Results:

The pool did not hold a lot of attraction to wildlife during the year. Most of the use occurred during December when the water was frozen in other areas. Geese and a few ducks were observed loafing in the pool.

#### Facilities:

The north, south and west dikes are in excellent condition. The east dike has some erosion problems at the toe. A water gauge is in place but needs an additional extension on it.

#### Costs:

The dikes were mowed once and grading of roads was half completed. Purple loosestrife was sprayed along the north and west dikes in August. Five gallons of Rodeo solution was used (approximately 1/2 acre spot sprayed).

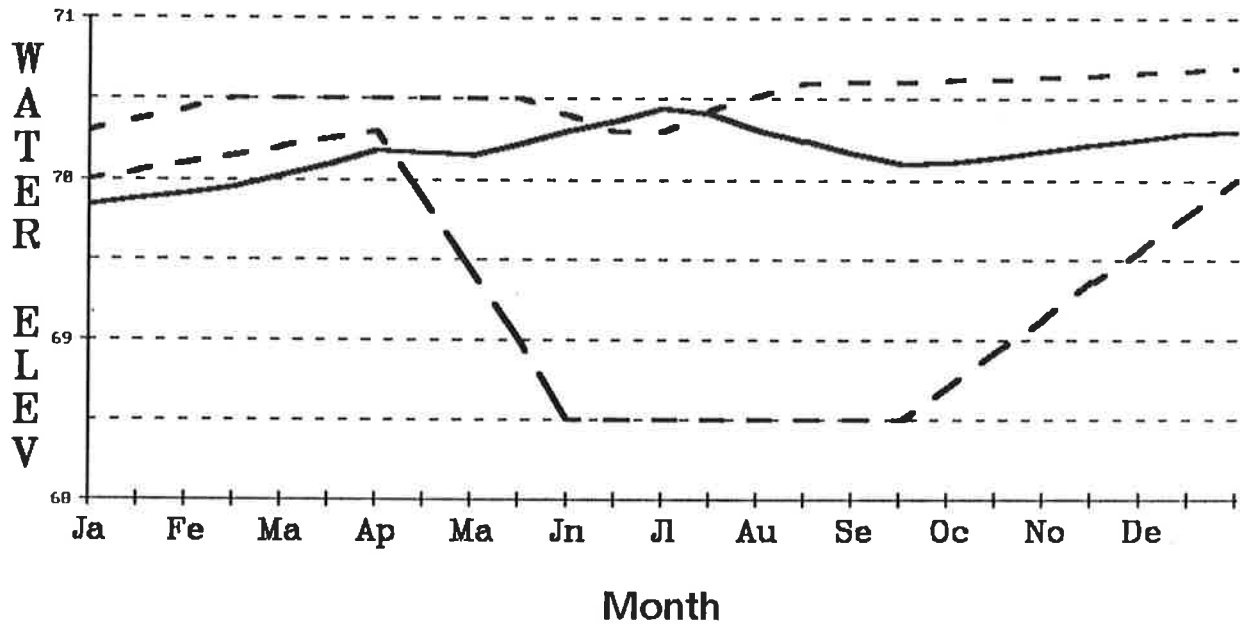
### B.2 Objectives of the 1990 Proposed Water Levels

Maintain water level to encourage growth of emergents. Island in the pool will be cleared for a banding site for use in a black duck study. This will also help in setting back succession and providing a nesting island in future years.

1. Unit Pool 2B
2. Acres 95
3. Maximum elevation permissible 572
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 568
- 90% bottom exposed -

## POOL 2B

— Actual  
 -- Planned  
 - - 90 Plan



### 7. Vegetation:

Species	1987	1988	1989
<u>Cattail</u>	<u>3</u>	<u>3</u>	<u>3</u>
<u>Willow/Cottonwood</u>	<u>8</u>	<u>10</u>	<u>10</u>
<u>Smartweed/Millet</u>	<u>25</u>	<u>30</u>	<u>35</u>
<u>Open Water/Cottonwood Seed</u>	<u>45</u>	<u>47</u>	<u>10</u>
<u>Smartweed/Cottonwood Seed</u>	<u>21</u>	<u>5</u>	<u>10</u>
<u>Bidens/Milkweed/Other</u>	<u>12</u>	<u>10</u>	<u>10</u>
<u>Submerged aquatics</u>	<u>          </u>	<u>          </u>	<u>20</u>
<u>American Lotus</u>	<u>          </u>	<u>          </u>	<u>2</u>

### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>41,000</u>	<u>47,100</u>	<u>45,000</u>
<u>Geese</u>	<u>12,000</u>	<u>22,300</u>	<u>37,800</u>
<u>GBH</u>	<u>1,500</u>	<u>1,600</u>	<u>1,400</u>

9. Purple Loosestrife: Small patches along north dike.

## Pool 2B

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water level was maintained (not fluctuated).

#### Results:

Excellent submerged aquatics continued to develop in the entire pool. Cottonwood seedlings continue to grow in the pool.

#### Facilities:

The toe of the north and west dikes are eroded from past high water levels. A water level gauge was incorrectly placed in the NW barrow pit. It should cover the lower elevations not covered by the gauge on the Pool 2B/C WCS but it has moved since placement.

#### Costs:

The dikes were mowed once and grading of roads was half completed.

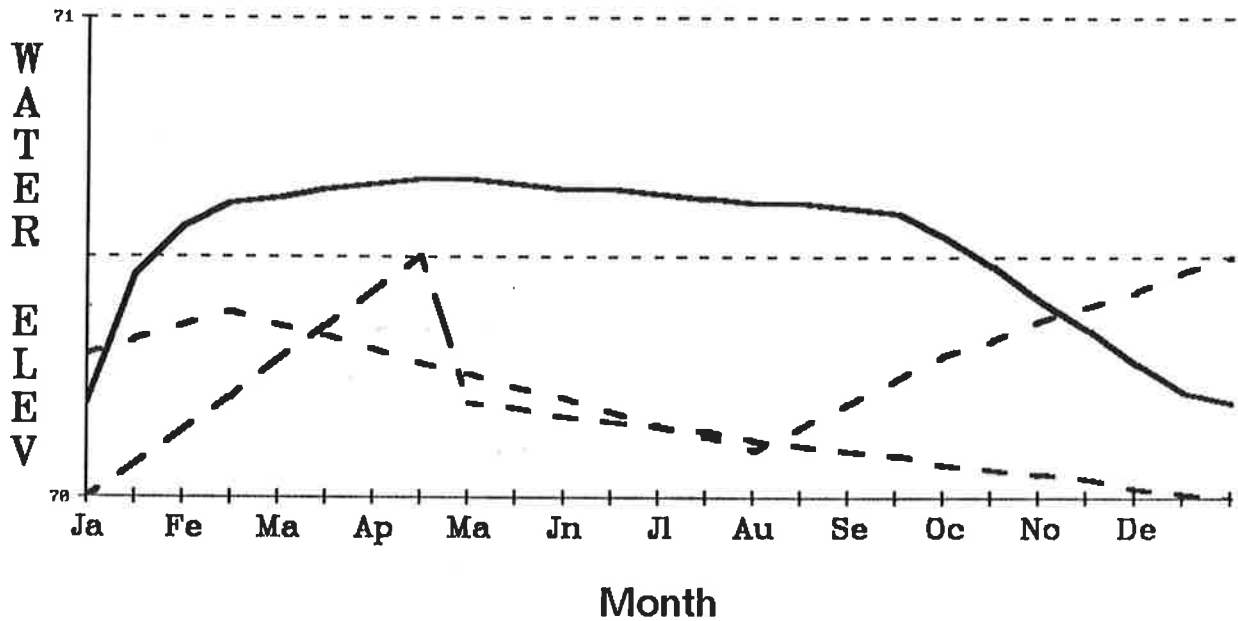
### B.2 Objectives of the 1990 Proposed Water Levels

Water levels should be maintained then raised to encourage cattail growth. The areas in the public use section are lacking in cattails due to the high muskrat populations. This area has not been trapped for more than ten years and efforts should be made to control the muskrat population.

1. Unit Pool 2C
2. Acres 80
3. Maximum elevation permissible 571
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 569
- 90% bottom exposed -

## POOL 2C

— Actual  
 -- Planned  
 -- 90 Plan



### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Aquatic Smartweed</u>	<u>1</u>	<u>1</u>	<u>2</u>
<u>Smartweed</u>	<u>10</u>	<u>15</u>	<u>10</u>
<u>Millet/Other</u>	<u>50</u>	<u>34</u>	<u>25</u>
<u>Open Water/Submergents</u>	<u>40</u>	<u>45</u>	<u>40</u>
<u>Cattail</u>	<u>          </u>	<u>5</u>	<u>20</u>
<u>American Lotus</u>	<u>          </u>	<u>          </u>	<u>3</u>

### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>42,000</u>	<u>55,000</u>	<u>49,900</u>
<u>Geese</u>	<u>25,000</u>	<u>24,400</u>	<u>45,000</u>
<u>GBH</u>	<u>2,500</u>	<u>1,900</u>	<u>2,000</u>

9. Purple Loosestrife: No plants were observed.

## Pool 2C

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels were allowed to fluctuate between 70 and 70.6.

#### Results:

Maintained water levels continued to discourage cottonwood seedlings and encourage cattails. This until was used by several broods of pied-billed grebes and many coot. Lotus is beginning to encroach in the middle of the pool.

#### Facilities:

The ground immediately around the Pool 2B/C WCS is eroding. A muskrat hole follows the culvert through the dike. Other dikes are in good shape. A new water level gauge was installed in 1988.

#### Costs:

The dikes were mowed once and grading of roads was half completed.

### B.2 Objectives of the 1990 Proposed Water Levels

Keep water levels relatively stable throughout the year to encourage further growth of emergents and allow for submergent plant growth.

9. Purple Loosestrife: Infestation along north dike.

### Pool 3

#### A.2 Effects of Past Year's Water Levels

##### Levels:

Water levels are now maintainable after construction was completed in August. "Actual" line indicated on the graph is an estimate due to lack of water level gauge.

##### Results:

The east end of the pool was used heavily by geese, and ducks during fall migration as a loafing area. West end of the unit is still choked with cattail and brush.

##### Facilities:

Construction on the south dike was completed. A new water control structure was placed along the south dike in 1989. A water gauge is needed to more accurately manage the water levels.

##### Costs:

The construction of the south dike and water control structure was included in the cost of the Tank Ditch project which cost \$ 12,046,617.14 and was covered by the Flood Damage monies.

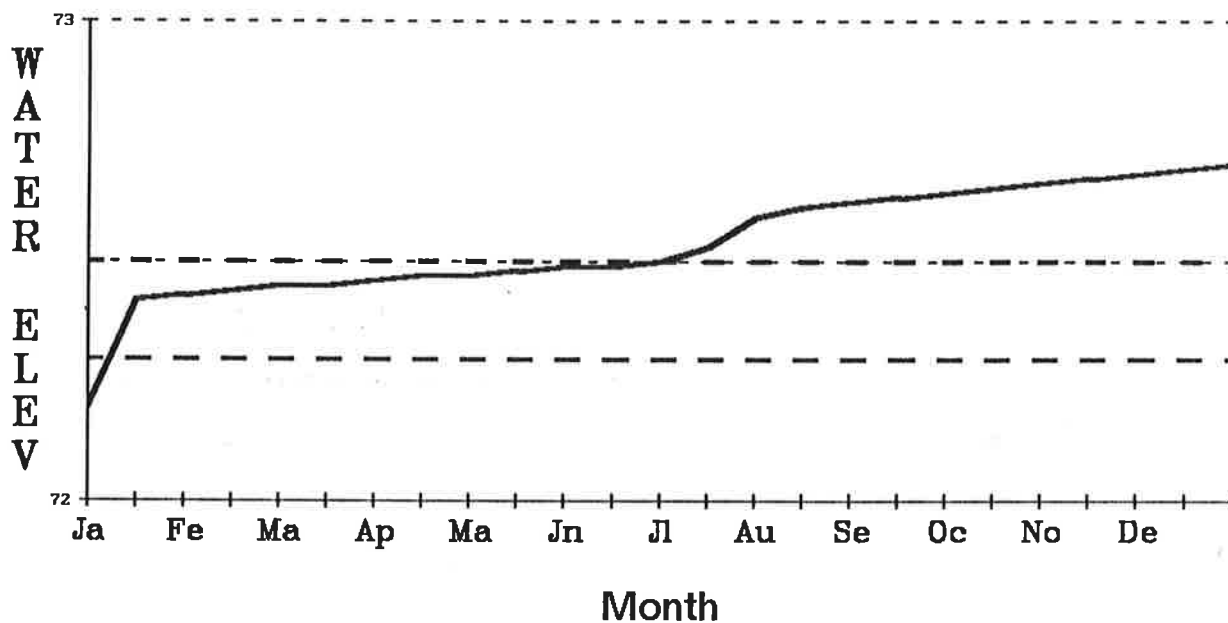
#### B.2 Objectives of the 1990 Proposed Water Levels

Water levels need to be high in the west end to open up cattail and brush and high to discourage Purple Loosestrife and Phragmites growth encroaching on the north dike. More drastic measures may have to be taken on the east end of the pool to open it up. Cutting of brush by contractor is a suggestion.

1. Unit Pool 6 (Woodies Roost)
2. Acres 160
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
- 90% bottom exposed -

### POOL 6 - W. ROOST

— Actual  
-- 89 Plan  
-- 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
Open Water	50	35	40
Wooded	10	10	10
Cattail	40	39	35
Smartweed/Millet		15	10
Aquatic Smartweed		1	5

#### 8. Wildlife Use:

	1987	1988	1989
Ducks	10,000	6,000	5,500
Geese	20,000	9,200	5,800
GBH	2,500	1,800	1,500

9. Purple Loosestrife: Two plants along the west dike were sprayed. No other plants observed.

## Pool 6 (Woodies Roost)

### A.2 Effects of Past Year's Water Levels

#### Levels:

The pool fluctuated along the with lake levels.

#### Results:

Areas of dense cattail are still present. Area has limited use by geese, ducks, and herons. Muskrat dike damage continues to be a problem.

#### Facilities:

East and south dikes are no longer capable of retaining water. Both dikes are severely eroded in areas and are riddled with muskrat/woodchuck holes. The north half of the east dike is overgrown with sumac and dogwood and is barely wide enough to ride an ATV on. The north dike also has some erosion and muskrat hole problems.

#### Costs:

Brush along the south and north dikes was mowed once.

### B.2 Objectives of the 1990 Proposed Water Levels

Attempt to hold water high this year to allow the muskrat population to build and open the dense cattail stands along the pool's edge. The pool should hold water if the ODNR does not lower their adjacent unit. This unit is scheduled for renovations in the near future in conjunction with the North American Waterfowl Management Plan.



## Pool 9

### A.2 Effects of Past Year's Water Levels

#### Levels:

The pool fluctuated along the with lake levels.

#### Results:

Areas of dense cattail are still present. Area has limited use by geese, ducks, and herons. Muskrat dike damage continues to be a problem.

#### Facilities:

The north dike is eroded and riddled with muskrat/woodchuck holes and covered with trees and brush. It is scheduled for reconstruction along with Metzger's Marsh according to the North American Plan, St. Lawrence Project. The west dike also has some holes and brush on it. The south dike was reconstructed in the Tank Ditch contract in 1989. A water control structure was also placed in the southeast corner of the unit.

#### Costs:

Costs incurred for the south dike and water control structure are covered by the contract costs of the Tank Ditch contract.

### B.2 Objectives of the 1990 Proposed Water Levels

This unit has not been in the management plan for a while due to inability to manage it. This year it was decided that the water would be kept high to discourage cattail until early fall when it would be drained and the ODNR will mow strips in the cattail with our equipment. This is to improve the hunting blinds in the pool and also for management of the pool itself. Also the brush will be cut along the small dike which borders the pool to the west. A staff gauge will be installed so that accurate water level readings can be taken.

- ## ENTRANCE (HQ) POOL

Month	Solid Line (Feet)	Dashed Line (Feet)	Dotted Line (Feet)
Ja	72.2	71.8	72.0
Fe	71.0	71.0	72.0
Ma	71.4	71.1	72.0
Ap	71.4	71.1	72.0
Ma	70.0	71.2	72.0
Jn	70.2	71.3	72.0
Jl	70.5	71.4	72.0
Au	70.8	71.5	72.0
Se	71.0	71.6	72.0
Oc	71.2	71.7	72.0
No	71.4	71.8	72.0
De	71.8	72.3	72.0

Species	1987	1988	1989
Open Water	20	10	10
Cattail	50	7	15
Wet Meadow	20	20	20
Smartweed	0	15	10
Willow/Brush	10	10	12
Upland		38	33

Wildlife Use:	1987	Use Days	
	1988	1989	
Ducks	10,000	2,200	5,600
Geese	8,000	5,800	6,500
GBH	1,000	600	1,300

9. Purple Loosestrife: Large patches of loosestrife in the middle of the east side of the pool.

Entrance Pool  
(Headquarter's Pool)

A.2 Effects of Past Year's Water Levels

Levels:

In May the water level was dropped to facilitate construction in the adjacent area. Water levels gradually rose after construction was completed. Some water was pumped in to the pool in September to meet planned levels.

Results:

Excellent vegetation response with smartweed and millet developing in disturbed areas. Much of the cattail present was left dry. Low water levels encouraged the spread of Purple loosestrife in the area.

Facilities:

The north dike is in perfect shape after completion of the construction. The pool is in need of a water level gauge.

Costs:

The unit was pumped in the fall. Twelve gallons of Rodeo solution was sprayed on plants spreading through out the unit.

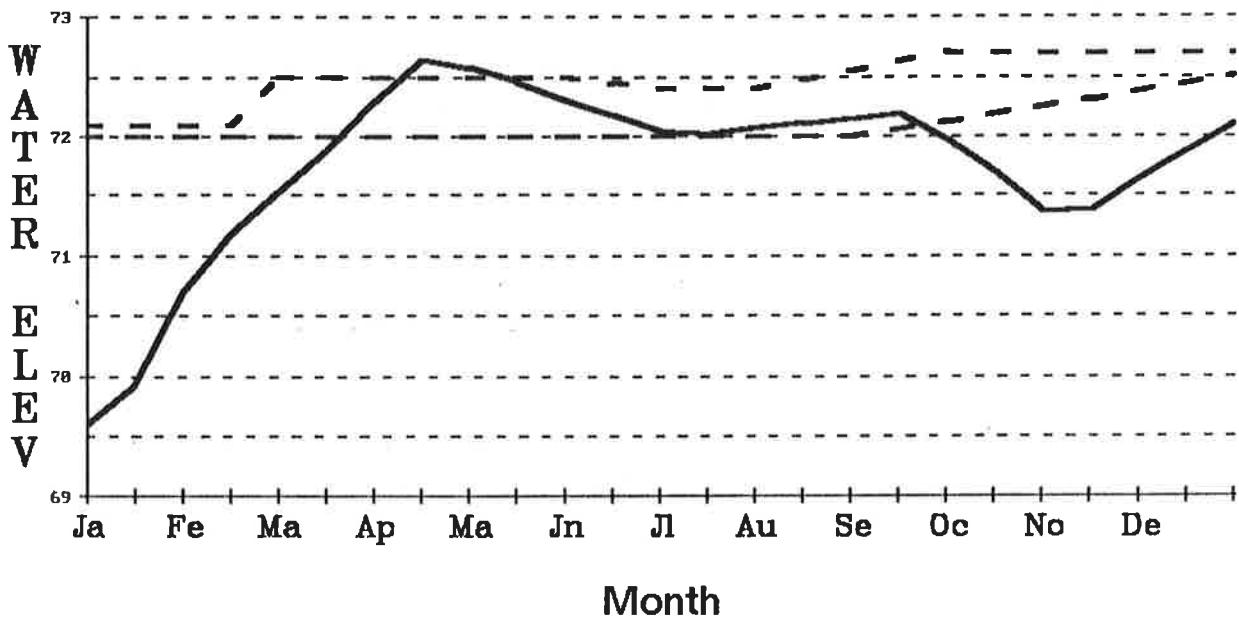
B.2 Objectives of the 1990 Proposed Water Levels

High water levels should be maintained to discourage the spread of Purple Loosestrife, to open up thick stands of cattails, and discourage cottonwood and willow.

1. Unit Show Pool
2. Acres 30
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 572
- 90% bottom exposed -

## SHOW POOL

— Actual  
-- 89 Plan  
-- 90 Plan



### 7. Vegetation:

Species	%1987	%1988	%1989
Open Water	35	35	35
Cattail/Bulrush	5	10	15
Wet Meadow/Smartweed	10	30	10
Cottonwood	15	10	15
Submergents	25	0	10
Phragmites	15	15	15

### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
Ducks	8,000	1,900	2,500
Geese	7,000	10,200	8,200
GBH	1,000	1,000	1,100

9. Purple Loosestrife: Plants throughout the pool. Spotty all over with concentrations along the north and east edges.

## Shaw Pool

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels gradually increased after construction was completed. Water was pumped in the pool in August to facilitate Purple loosestrife spraying with the airboat.

#### Results:

Due to lower water levels (construction) Purple loosestrife has spread through out the pool. Smartweed and millet grew in construction disturbed areas. Limited use by ducks, geese and great blue herons occurred.

#### Facilities:

The north and east dikes were totally redone in 1988-89. The south dike leaks into the wooded area around the shop and office. There are currently no plans for repair. The faulty water control structure was fixed in November 1988.

#### Costs:

All clearing, grubbing and grading of the dikes is covered by the Pool 1 contract. Twenty four gallons of Rodeo solution were used on loosestrife through out the pool.

### B.2 Objectives of the 1990 Proposed Water Levels

Maintain a high water level to discourage loosestrife and Phragmites.

9. Purple Loosestrife: None Noted.

## Mini Marsh

### A.2 Effects of Past Year's Water Levels

#### Levels:

Construction of the pump station was completed this year. Water levels fluctuated with the lake as the north and east dikes are in need of repair. Water level gauge is not present in this pool, as a result no water levels were taken.

#### Results:

Cattails dominated the pool along with open water when the lake was up.

#### Facilities:

The north and east dikes are severely eroded and not safe for vehicle travel. All dikes are riddled with woodchuck and muskrat holes and are unsafe for walking. The construction on the dikes is to take place at the beginning of 1990.

#### Costs:

Construction of pump structure was included in the Tank Ditch construction project.

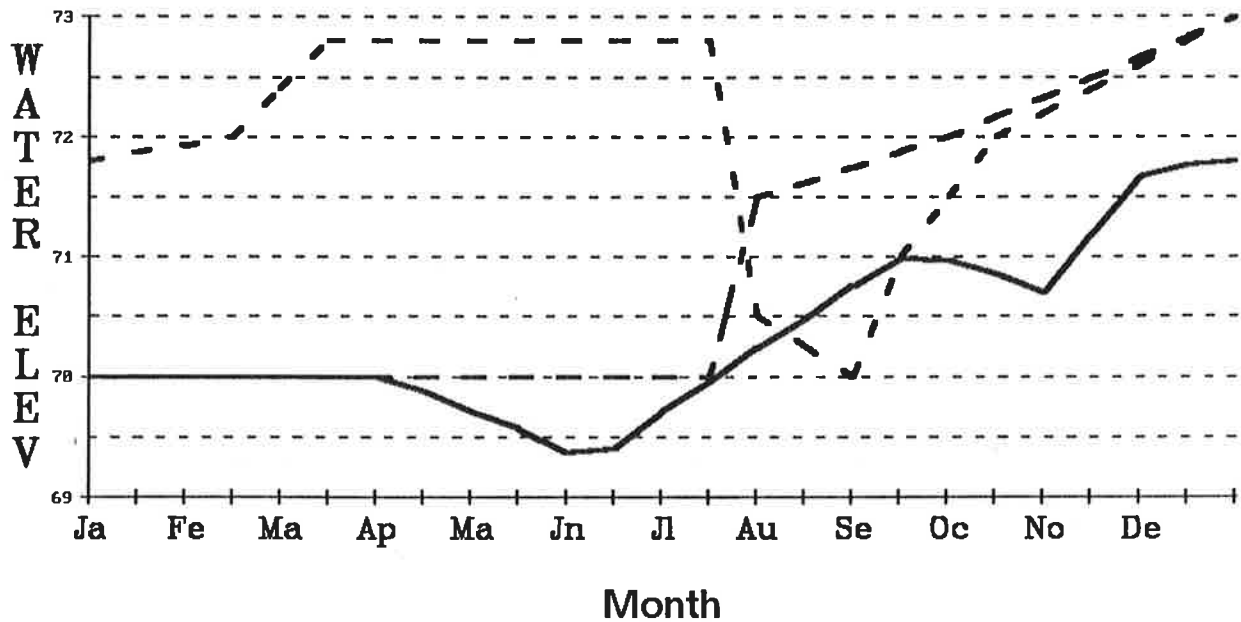
### B.2 Objectives of 1990 Proposed Water Levels

Dewater for construction early in the year. Fill slowly to moist to encourage smartweed and millet then fill gradually to maintain 8 to 12 inches for waterfowl use in the fall. A water level gauge should be placed after construction is complete and before the water level is raised.

1. Unit MSU 3
2. Acres 213
3. Maximum elevation permissible 574.5
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 571.5
- 90% bottom exposed -

### MSU 3

— Actual  
 -- 89 Plan  
 - - 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Emergents</u>	<u>75</u>	<u>50</u>	<u>63</u>
<u>Open Water</u>	<u>0</u>	<u>10</u>	<u>2</u>
<u>Smartweed/Millet</u>	<u>20</u>	<u>20</u>	<u>10</u>
<u>Bidens/Cottonwood</u>	<u>5</u>	<u>5</u>	<u>15</u>
<u>Wet Meadow</u>	<u>          </u>	<u>15</u>	<u>10</u>
<u>                  </u>	<u>          </u>	<u>          </u>	<u>          </u>

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>400,000</u>	<u>97,300</u>	<u>32,000</u>
<u>Geese</u>	<u>275,000</u>	<u>79,000</u>	<u>55,000</u>
<u>GBH</u>	<u>1,500</u>	<u>2,300</u>	<u>1,000</u>

#### 9. Purple Loosestrife: None observed.

### MSU 3

#### A.2 Effects of Past Year's Water Levels

##### Levels:

Water levels were kept very low in this pool due to construction. Most of the unit had no water through out the growing season.

##### Results:

Low water levels encouraged upland species including willow, cottonwood, etc. Some millet was present but not much. Lack of water in the spring, summer and fall decrease duck and goose use on the area.

##### Facilities:

Placement of WCS, filter fabric, rip rap and topsoil was completed this year. Refuge staff continued to work on the west dike. The north portion of the dike was bulldozed to strengthen it, but more fill must be placed and sloping and rip rap done to finish it. The south dike is eroded at the toe, but is not scheduled for work in the near future.

##### Costs:

Construction costs are covered under the Tank Ditch Project. Pumping costs totalled \$ 708.31 for the year.

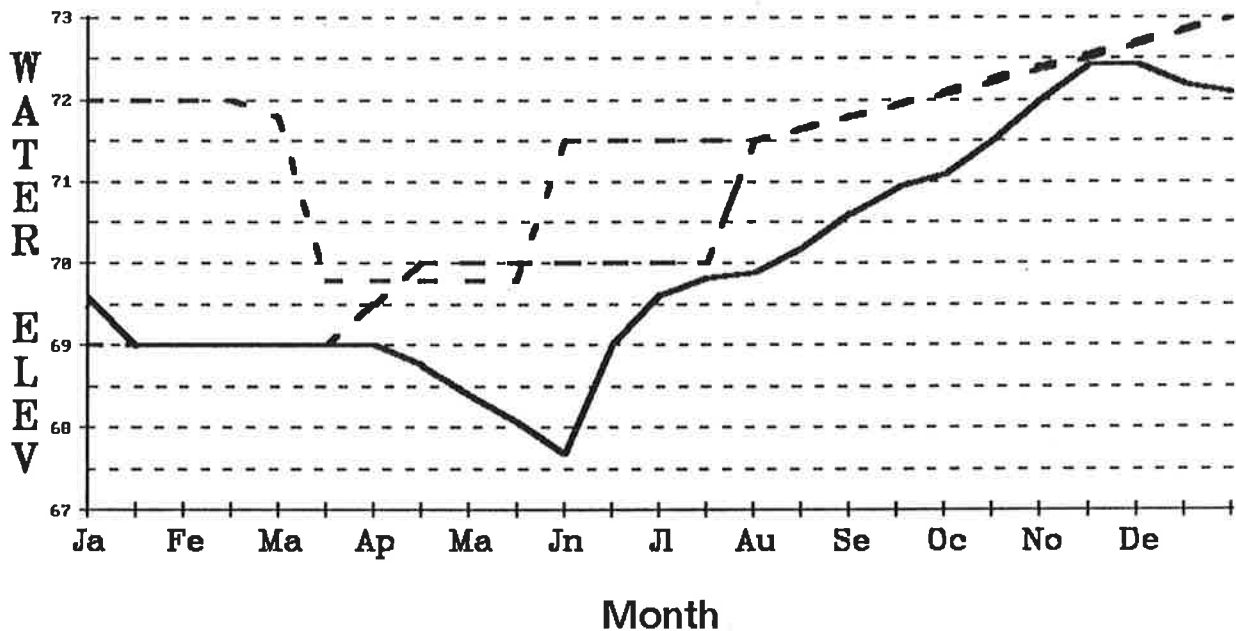
#### B.2 Objectives of the 1990 Proposed Water Levels

This pool should be maintained with high water levels to discourage brush encroachment. Then in the fall it should be dewatered and disked to prepare it for moist soil conditions next year. After disking water should be very gradually added.

1. Unit MSU 4
2. Acres 106
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 571.5
- 90% bottom exposed -

### MSU 4

— Actual  
 -- 89 Plan  
 - - 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
Reed Canarygrass/Willow	3	15	20
Millet/Bidens/Smartweed	12	50	15
Agriculture	75	30	5
Borrow	5	5	5
Upland			55

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
Ducks	15,000	4,400	3,000
Geese	30,000	4,700	4,000
GBH	250	400	200

#### 9. Purple Loosestrife: None noted.

#### MSU 4

##### A.2 Effects of Past Year's Water Levels

###### Levels:

Water levels were kept low due to construction. After construction was completed levels were gradually raised.

###### Results:

The area was kept too dry to produce moist soil plants except near ditches where soil had been disturbed due to construction. Corn stubble still remains in one section of the unit. Some duck use occurred in the ditch areas. Reed canary grass and willow now dominate the unit.

###### Facilities:

Construction was completed by September. Dikes and water control structures are now in good shape.

###### Costs:

Construction costs are covered in the Tank Ditch contract. Electricity to run the moist soil pump cost approximately \$ 708.31. The moist soil pump broke down in midsummer.

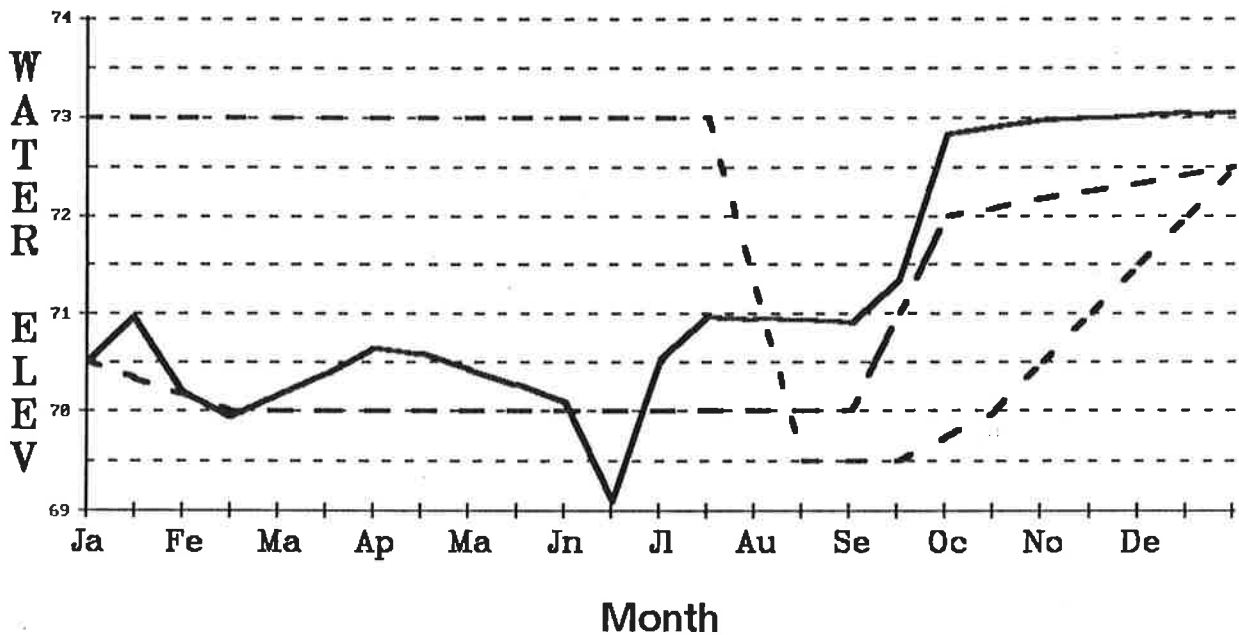
##### B.2 Objectives of the 1990 Proposed Water Levels

Dewater the unit early in spring so that the unit can be disked to set back succession and encourage moist soil plants. After plowing add water to cover the unit and discourage early seeding unwanted species. Early in the summer drop water levels to moist to encourage moist soil plants. Flood in fall to provide food for migrating waterfowl.

1. Unit MSU 5
2. Acres 250
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 567
5. Water Elev. with 50% bottom exposed - 570.5  
90% bottom exposed -

### MSU 5

— Actual  
-- 89 Plan  
-- 90 Plan



#### 7. Vegetation:

Species	1987	1988	1989
Millet/Smartweed	6	55	40
Agriculture	80	0	0
Bidens	0	10	10
Cattail/Reed Canarygrass	5	10	5
Cottonwood/Willow	5	15	40
Velvet Leaf	4	10	5

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
Ducks	350,000	4,400	10,000
Geese	290,000	5,500	20,000
GBH	500	700	400

#### 9. Purple Loosestrife: None observed.

## MSU 5

### A.2 Effects of Past Year's Water Levels

#### Levels:

Actual levels generally followed planned levels during the year. Water levels were low due to construction. Water levels were increase once the construction was completed.

#### Results:

Vegetation response was poor over the entire unit. The early drawdown and very dry conditions during the spring and summer encouraged more velvet leaf, cocklebur and established willow seedlings than moist soil plants. Some areas remained bare soil. A few small stands of smartweed grew in low areas or close to the ditch near disturbed areas. Willow cocklebur/velvet leaf and saplings were mowed in August. Then water levels were raised to drown out saplings.

#### Facilities:

Filter fabric, rip rap and placement of the water control structure was completed in 1989.

#### Costs:

Construction costs are covered by the Tank ditch contract. Areas in the unit were mowed. Electricity to run the moist soil pump totalled \$ 708.31 for the unit.

### B.2 Objectives of the 1990 Proposed Water Levels

Water levels need to be kept high to discourage growth of undesirable species. If personnel is available the area should be disked in the late summer/early fall to set back succession. Then raise water levels until wet to moist. Flood in the fall for migration.

7. Vegetation:

## 8. Wildlife Use:

9. Purple Loosestrife: None noted.

## MSU 6

### A.2 Effects of Past Year's Water Levels

#### Levels:

The unit fluctuates with the lake through breached dikes. The lake levels fluctuated from high to low so the area had some water then went dry in the fall.

#### Results:

Cattail is dominate with willow, cottonwood and Phragmites expanding into the area.

#### Facilities:

The north and south dikes need complete rebuilding to make this a functional unit. The east and west dikes will also require major repairs. Minor extension of inlet/outlet culverts to the moist soil pump is all that's needed to provide active water level control if the dikes could hold water. Current plans are to renovate this unit in the near future within the North American Waterfowl Management Plan.

#### Costs:

Brush along the east dike was mowed to facilitate the dragline to muck out in the adjacent ditch/pump intake.

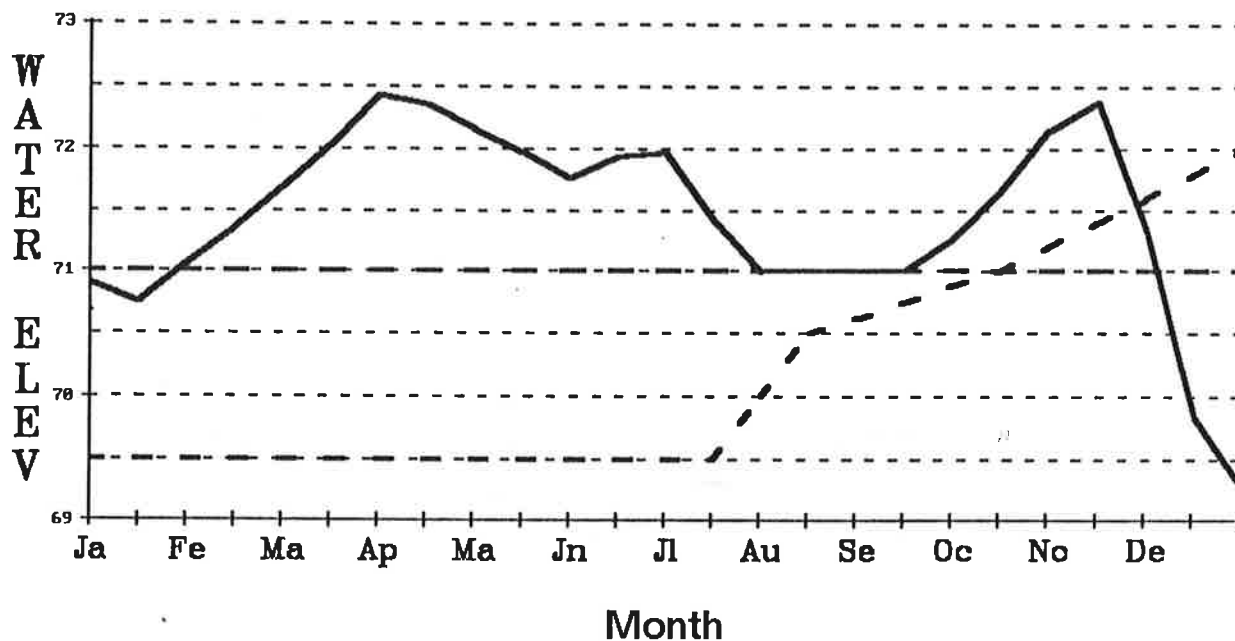
### B.2 Objectives of the 1990 Proposed Water Levels

There is no way to control water levels in this unit. It is kept in the management regime as a reminder that it requires attention.

1. Unit MSU 7A
2. Acres 49
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 570.5
5. Water Elev. with 50% bottom exposed - 572.0
- 90% bottom exposed -

### MSU 7A

— Actual  
 -- 89 Plan  
 -- 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Upland Species</u>	<u>30</u>	<u>30</u>	<u>35</u>
<u>Cattail</u>	<u>0</u>	<u>0</u>	<u>5</u>
<u>Millet</u>	<u>25</u>	<u>15</u>	<u>10</u>
<u>Bidens</u>	<u>45</u>	<u>30</u>	<u>20</u>
<u>Smartweed</u>	<u>0</u>	<u>25</u>	<u>15</u>
<u>Cottonwood/willow</u>	<u>          </u>	<u>          </u>	<u>15</u>

#### 8. Wildlife Use:

	1987	Use Days 1988	1989
<u>Ducks</u>	<u>22,000</u>	<u>19,200</u>	<u>12,000</u>
<u>Geese</u>	<u>45,000</u>	<u>19,500</u>	<u>8,000</u>
<u>GBH</u>	<u>600</u>	<u>250</u>	<u>350</u>

9. Purple Loosestrife: Scattered plants especially on the east end of the unit.

## MSU 7A

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels fluctuated with the lake after completion of the water control structure.

#### Results:

Area was extremely dry all summer. Upland species such as goldenrod, cocklebur and asters covered most of the unit. Barley foxtail and some millet grew in lower areas. The south end of the unit has some loosestrife and willow problems.

#### Facilities:

The new pump station was installed in 1989. The north dike is severely eroded with some areas barely 3 feet wide. It is scheduled for reconstruction at the beginning of 1990.

#### Costs:

The new pump station costs were covered under the Tank Ditch contract. It cost \$ 200 for electrical hook up to the pump unit. Electricity for pumping cost \$ 123.34. Two gallons of Rodeo solution was sprayed on loosestrife plants in the area.

### B.2 Objectives of the 1990 Proposed Water Levels

Leave the unit dry in spring to facilitate dike construction. Plans are to create a wetland in the north end using the dozer and to farm the south end to set back succession. The water will most likely remain low until the construction is complete then raise to flood the wetland only.

9. Purple Loosestrife: Scattered plants especially on the west side.

## MSU 7B

### A.2 Effects of Past Year's Water Levels

#### Levels:

This unit has no independent water control structure. All water level management is accomplished through 7A.

#### Results:

Low areas in the unit trapped enough water to produce several small stands of millet and to hold some duck and goose use. Upland species dominated the rest of the unit and cottonwood is invading the north and west side. Loosestrife plants are beginning to invade the area.

#### Facilities:

The north dike is severely eroded with some areas barely three feet wide. Dike construction is scheduled for spring of 1990.

#### Costs:

Two gallons of Rodeo solution was sprayed on loosestrife plants in the unit.

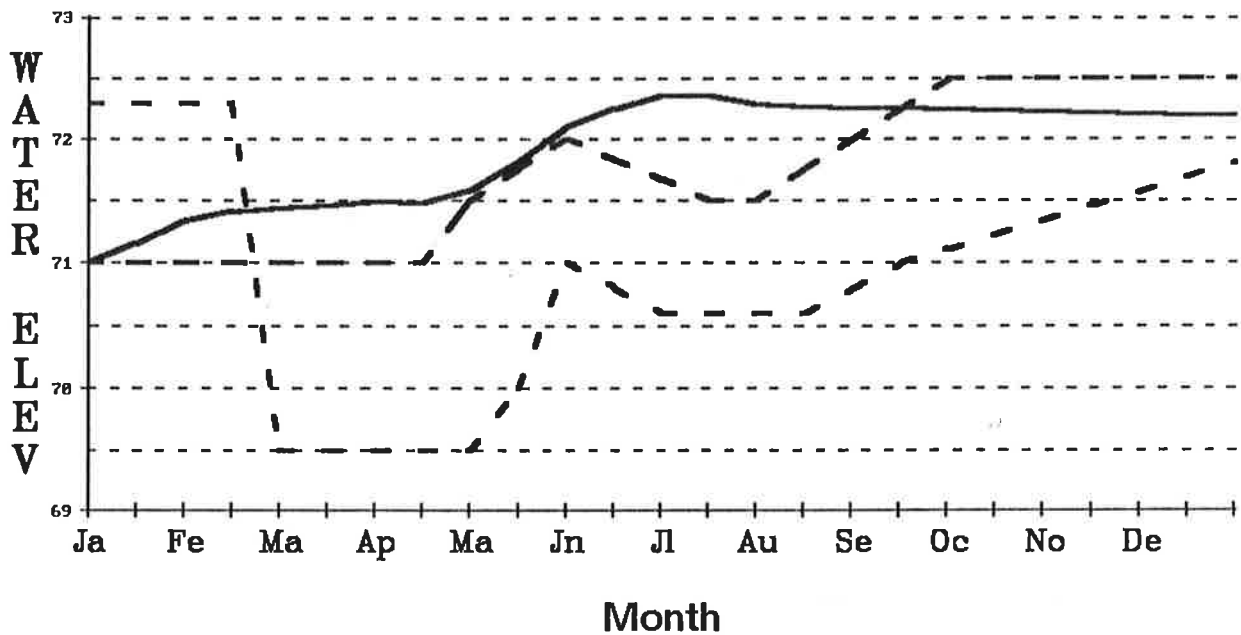
### B.2 Objectives of the 1990 Water Levels

Leave the unit dry in spring to facilitate dike construction. Plans are to create a wetland in the north end using the dozer and to farm the south end to set back succession. The water will most likely remain low until the construction is complete then raise to flood the wetland only.

1. Unit MSU 8A
2. Acres 44
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 570
5. Water Elev. with 50% bottom exposed - 571.5
- 90% bottom exposed -

## MSU 8A

— Actual  
 -- 89 Plan  
 - - 90 Plan



### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Millet/Smartweed</u>	<u>11</u>	<u>20</u>	<u>25</u>
<u>Bidens</u>	<u>8</u>	<u>2</u>	<u>5</u>
<u>Open Water</u>	<u>(70)</u>	<u>50</u>	<u>45</u>
<u>Upland Sup./Velvet Leaf</u>	<u>11</u>	<u>25</u>	<u>20</u>
<u>Cottonwood/Willow</u>	<u>0</u>	<u>3</u>	<u>5</u>

### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>30,000</u>	<u>48,500</u>	<u>36,500</u>
<u>Geese</u>	<u>35,000</u>	<u>7,400</u>	<u>12,300</u>
<u>GBH</u>	<u>2,500</u>	<u>3,300</u>	<u>2,900</u>

### 9. Purple Loosestrife: None observed.

## MSU 8A

### A.2 Effects of Past Year's Water Levels

#### Levels:

Once construction was completed the water levels gradually rose.

#### Results:

Mixed results occurred with good stands of bidens and smartweeds mixed with even better stands of solid velvet leaf and cocklebur. Submerged aquatics developed on the east end.

#### Facilities:

A pump station was constructed in the south west corner of the unit in 1989.

#### Costs:

Construction costs for the pump station are covered in the Tank Ditch contract. Cost to electrically connect the pump cost \$ 200.

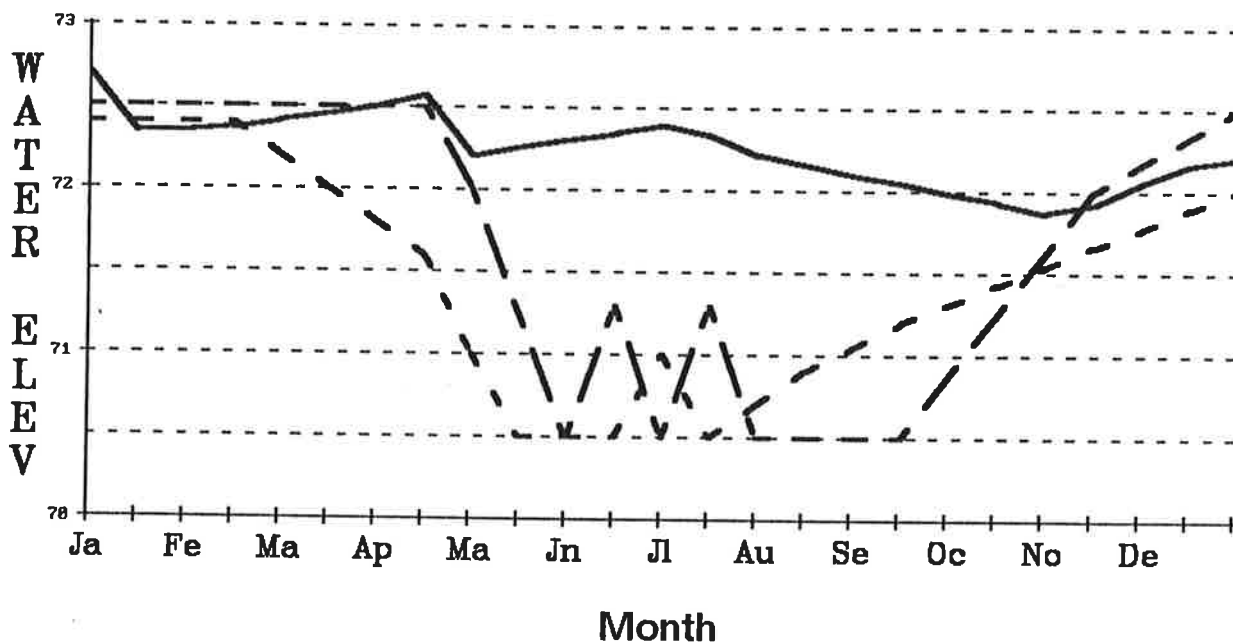
### B.2 Objectives of the 1990 Proposed Water Levels

Due to a crack in the pump station the unit will be drained in the spring to fix the wall. After this is completed water levels should be raised to discourage velvet leaf and cocklebur. A gradual release of water in June to moisten the unit will encourage moist soil plants. Water levels should be gradually raised in the fall to accommodate waterfowl use.

1. Unit MSU 8B
2. Acres 85
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 571.5
5. Water Elev. with 50% bottom exposed - 571
- 90% bottom exposed -

### MSU 8B

— Actual  
 -- 89 Plan  
 -- 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Millet (+ velvet leaf)</u>	<u>(33)</u>	<u>45</u>	<u>28</u>
<u>Bidens</u>	<u>55</u>	<u>30</u>	<u>15</u>
<u>Upland Species</u>	<u>6</u>	<u>10</u>	<u>5</u>
<u>Cocklebur</u>	<u>6</u>	<u>5</u>	<u>2</u>
<u>Water/Submerged Aquatics</u>		<u>10</u>	<u>15</u>
<u>Emergents (Rushes)</u>			<u>35</u>

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>75,000</u>	<u>101,000</u>	<u>85,000</u>
<u>Geese</u>	<u>35,000</u>	<u>29,500</u>	<u>32,000</u>
<u>GBH</u>	<u>1,000</u>	<u>2,500</u>	<u>12,000</u>

9. Purple Loosestrife: Scattered plants (five) in northeast corner of the pool.

## MSU 8B

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels fluctuated between 71.9 and 72.6 during the year.

#### Results:

The water levels encouraged millet and emergents (rushes). This unit had large numbers of ducks, geese, coots, great blue herons and Great egrets.

#### Facilities:

Minor erosion is a problem along the north dike. The unit should not be held high or the north and west dikes will erode unnecessarily. The pump station was completed in 1989.

#### Cost:

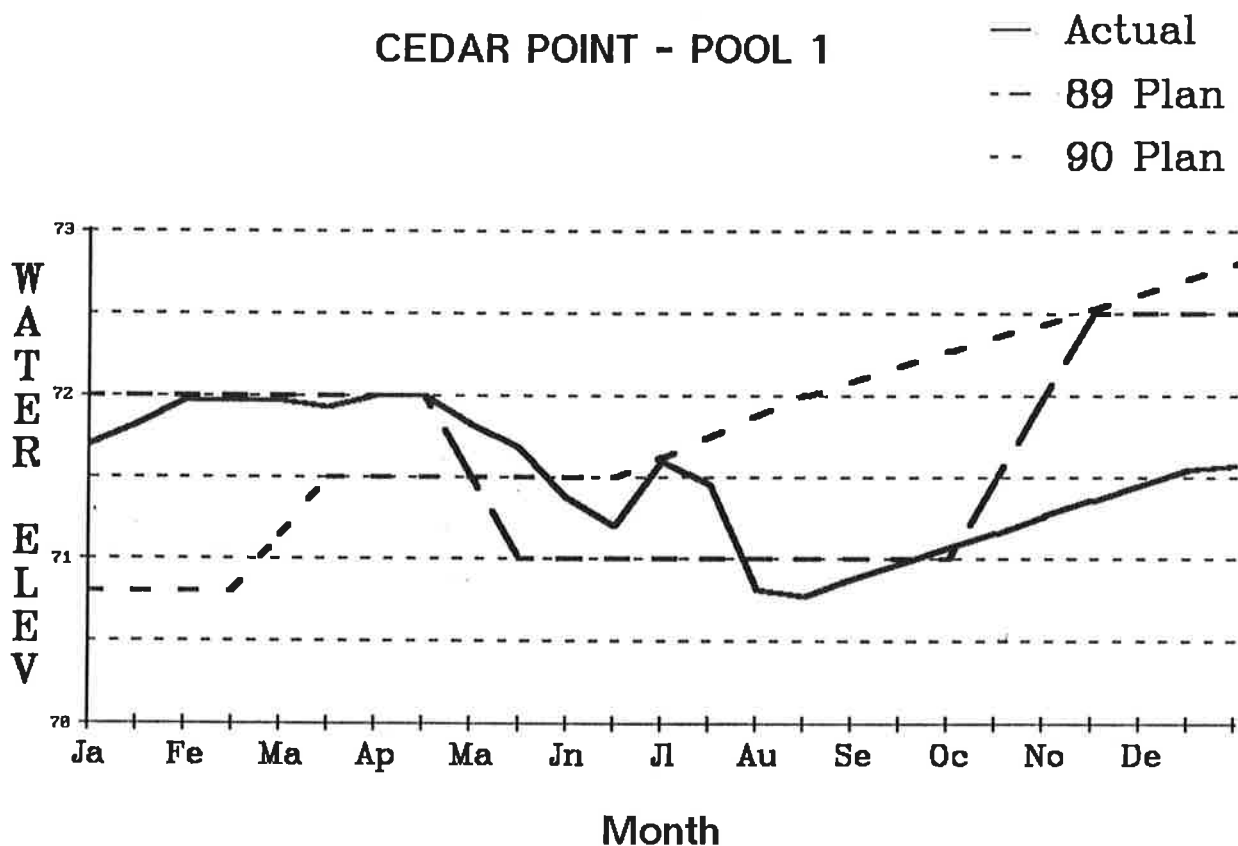
The new pump station cost was included in the Pool 1 contract. The dikes were mowed once.

### B.2 Objectives of the 1990 Proposed Water Levels

Drawdown slowly from April to May to encourage moist soil plants. Add several inches during the summer to wet the soil and drown undesirable species. Reflood in fall for waterfowl migration.

1. Unit Cedar Point - Pool 1
2. Acres 1,460
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571
- 90% bottom exposed -

### CEDAR POINT - POOL 1



7. Vegetation:

Species	%1987	%1988	%1989
<u>Open Water</u>	<u>45</u>	<u>3</u>	<u>25</u>
<u>Water Lily</u>	<u>10</u>	<u>2</u>	<u>3</u>
<u>Cattail</u>	<u>20</u>	<u>20</u>	<u>30</u>
<u>Burreed/Bulrush</u>	<u>5</u>	<u>10</u>	<u>5</u>
<u>Other</u>	<u>10</u>	<u>10</u>	<u>10</u>
<u>Smartweed/Milletts/Nutsedge</u>	<u>          </u>	<u>55</u>	<u>10</u>
<u>Phragmites/Purple Loosestrife</u>	<u>          </u>	<u>          </u>	<u>17</u>

8. Wildlife Use:

	1987	Use Days 1988	1989
<u>Ducks</u>	<u>560,000</u>	<u>693,000</u>	<u>589,000</u>
<u>Geese</u>	<u>110,000</u>	<u>53,000</u>	<u>96,300</u>
<u>GBH</u>	<u>16,000</u>	<u>40,600</u>	<u>25,600</u>

9. Purple Loosestrife: Large clusters of loosestrife through out the pool.

## Cedar Point - Pool 1

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels were kept low to facilitate construction. Much of the ditches in the pool were dry.

#### Results:

Many areas continued to developed dense stands of Walter's millet, smartweeds and nutsedge. Loosestrife and Phragmites continued to spread in the pool due to the low water levels. The area was too dry to encourage emergent vegetation.

#### Facilities:

The drainage canal between the Pheasant Farm and Pool 1 was renovated in 1989. A majority of the road system needs grading and gravel except along drainage canal where roads were redone along with construction. The dike that borders the fishing barrow pit is becoming dangerously narrow in two spots and is developing ruts that if hit at high speeds could result in disaster. A new pump structure was installed in Pool 1. All interior canals are completely silted in and need dredging. At this time, they are a hazard to anyone attempting to cross the 4' deep muck. Dikes were mowed once.

#### Costs:

Construction costs for dikes on the south end of the pool were covered by the Cedar Point Dike contract. Total contract price paid in 1989 was \$604,932.63. The pump structure costs were covered by the Cedar Point Pump Structure contract. To date \$ 252,500 of the total \$ 322,500 has been paid. Construction on the pump structure should be complete early in 1990. All the dikes were mowed once. Garlon 3A was aerially sprayed on 16 acres of loosestrife. Costs were paid by Dow Chemical. 24 gallons of Rodeo solution were also sprayed on loosestrife in the pool.

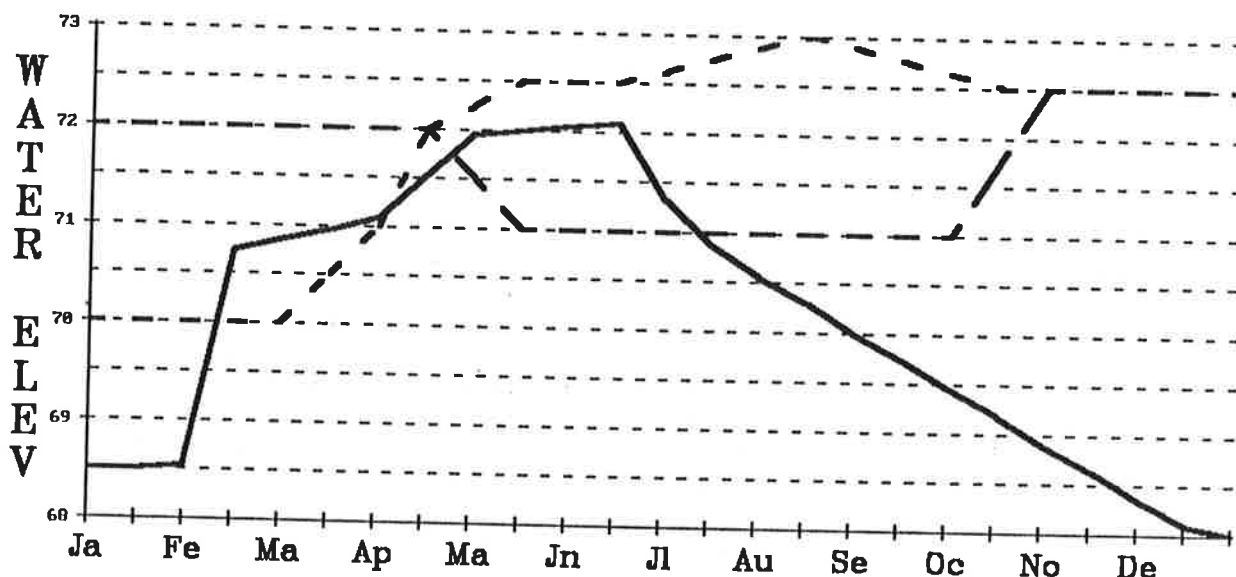
### B.2 Objectives of 1990 Proposed Water Levels

Gradually refill once the new pump is operational. Keep levels at a moderate level to encourage emergents and submergents and discourage purple loosestrife. Raise water level in the fall for waterfowl use.

1. Unit Cedar Point - Pool 2
2. Acres 135
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 569.4
5. Water Elev. with 50% bottom exposed - 571
- 90% bottom exposed -

## CEDAR POINT - POOL 2

— Actual  
-- 89 Plan  
-- 90 Plan



### 7. Vegetation:

### Month

Species	1987	1988	1989
Open Water	65	5	5
Cattail	20	20	28
Bullrush	5	5	5
Burreed	5	3	2
Phragmites/Willow	5	7	10
Smartweed/Millet/Nutsedge		60	20
Cottonwood/Willow			30

### 8. Wildlife Use:

	1987	1988	1989
Ducks	78,000	308,300	117,100
Geese	10,000	14,100	13,500
GBH	4,100	18,800	6,500

9. Purple Loosestrife: Small patches along the north dike, a large patch on the west end of the pool.

## Cedar Point - Pool 2

### A.2 Effects of Past Year's Water Levels

#### Levels:

Pool 2 water levels are directly connected with Pool 1 through the interconnecting water control structure. That structure was bypassed for construction so that Pool 1 would not refill. Water levels remained moderate.

#### Results:

Cottonwood seedlings, Phragmites, Purple loosestrife and cattail dominate this pool. The area should be burned next year.

#### Facilities:

The main water control structure has been silted in for years and the secondary structure connected to Pool 1 is unsafe. The elevation difference between Pool 1 & 2 make it difficult to add water to Pool 2 from that direction. The north and east dikes are in good condition. The south dike has little slope left and the east dike is breached.

#### Costs:

Dikes were mowed once. Nineteen gallons of Rodeo solution was used to spray loosestrife in the pool. Phragmites was also sprayed in the unit with 10 gallons of Rodeo.

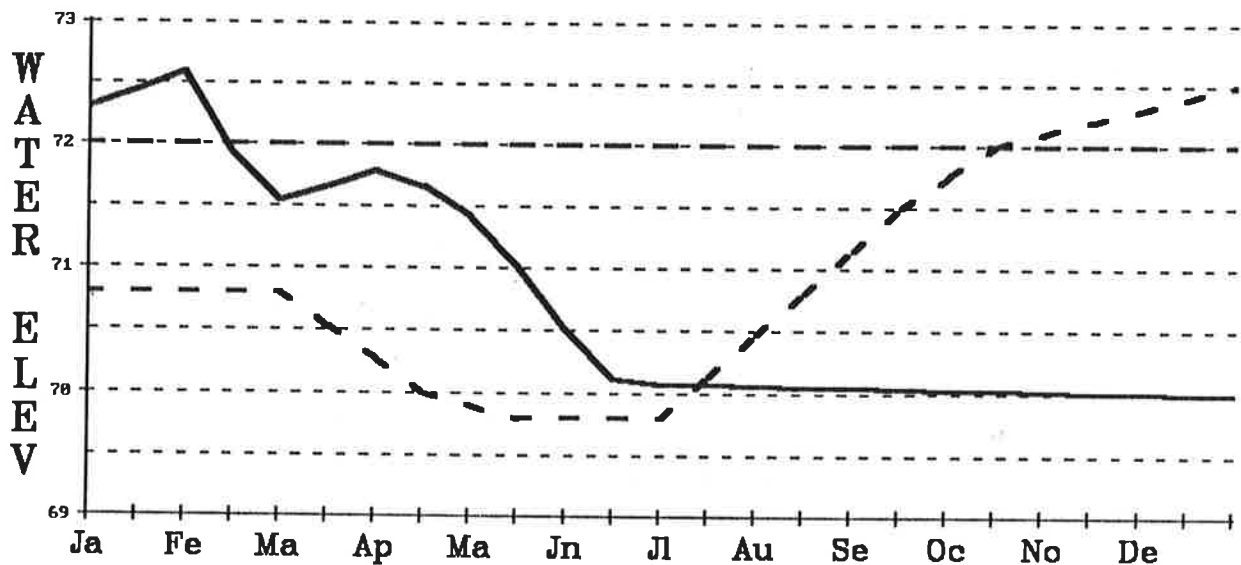
### B.2 Objectives of 1990 Proposed Water Levels

Maintain high water levels if possible to discourage purple loosestrife, phragmites, cotton wood and to open up cattail. The pool needs a water level gauge and a new control structure to pool 1. The lake dike structure should be inspected to see if the sand blocking it could be removed and a structure build in the lake to prevent more sand from entering.

1. Unit Cedar Point Pheasant Farm
2. Acres 155
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 571
5. Water Elev. with 50% bottom exposed - 571
- 90% bottom exposed -

## CEDAR POINT - PH. FARM

— Actual  
 -- 89 Plan  
 - - 90 Plan



### 7. Vegetation:

#### Month

Species	%1987	%1988	%1989
<u>Cattail</u>	<u>60</u>	<u>45</u>	<u>40</u>
<u>Open Water (submerg. aquatics)</u>	<u>25</u>	<u>20</u>	<u>10</u>
<u>Burreed/Arrowhead</u>	<u>10</u>	<u>5</u>	<u>5</u>
<u>Smartweed/Millet</u>	<u>5</u>	<u>20</u>	<u>10</u>
<u>Other (Purple Loosestrife)</u>	<u>          </u>	<u>10</u>	<u>35</u>

### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>40,000</u>	<u>175,500</u>	<u>71,905</u>
<u>Geese</u>	<u>4,000</u>	<u>33,000</u>	<u>4,100</u>
<u>GBH</u>	<u>2,000</u>	<u>8,500</u>	<u>2,500</u>

9. Purple Loosestrife: Large patches throughout. Some spots are becoming a homogenous stand of loosestrife.

## Cedar Point - Pheasant Farm

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels were low due to construction. Only barrow areas and ditches had water.

#### Results:

Purple Loosestrife continues to be a problem in this pool. Little duck use was observed in the area. Ditches have 4 feet of muck in them. Some smartweed growth was observed but the entire pool is dominated by loosestrife and cattail.

#### Facilities:

The dikes of this unit are in poor condition. Banks of the west and east dikes severely eroded. The south and north dikes are eroded on the interior side only.

#### Costs:

Fill was taken from the Northwest corner of the unit. This was done in conjunction with the Cedar Point Dike contract. Three acres of loosestrife was aerially sprayed with Garlon 3A. Costs were covered by Dow Chemical.

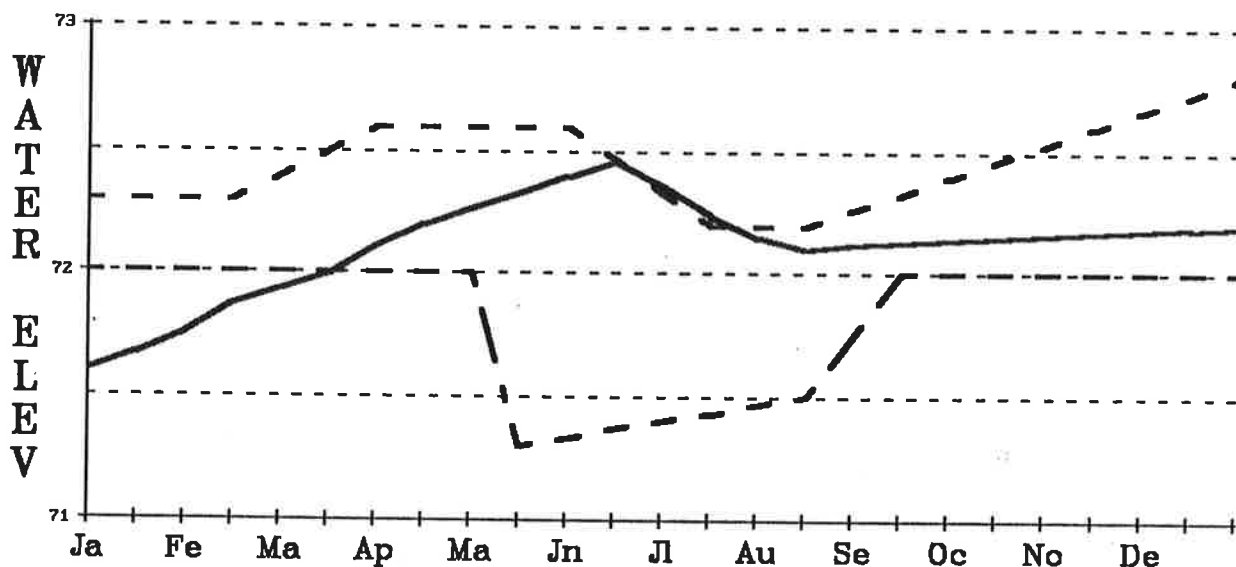
### B.2 Objectives of 1990 Proposed Water Levels

An effort should be made to farm this unit. If that is not possible, disking and planting to millet or something similar will help the loosestrife problem. This may be difficult due to problem dikes and mucky ditches. If these things are not possible, try to hold water levels stable at 6" to 10" above the general pool bottom to reduce purple loosestrife germination, open up cattails, and provide brood habitat.

1. Unit Darby - Pool 1
2. Acres 200
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 566
5. Water Elev. with 50% bottom exposed - 569
- 90% bottom exposed -

### DARBY - POOL 1

— Actual  
 -- 89 Plan  
 -- 90 Plan



#### 7. Vegetation:

Species	Month		
	1987	1988	1989
<u>Open Water</u>	<u>20</u>	<u>30</u>	<u>25</u>
<u>Bulrush/Burreed</u>	<u>10</u>	<u>5</u>	<u>5</u>
<u>Cattail, Bluejoint, Other</u>	<u>20</u>	<u>20</u>	<u>15</u>
<u>Floating Emergents</u>	<u>50</u>	<u>25</u>	<u>25</u>
<u>Smartweed/Millet/Nutsedge</u>	<u>          </u>	<u>25</u>	<u>10</u>
<u>Phragmites</u>	<u>          </u>	<u>          </u>	<u>10</u>
<u>Other</u>	<u>          </u>	<u>          </u>	<u>10</u>

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>94,000</u>	<u>157,500</u>	<u>110,000</u>
<u>Geese</u>	<u>30,000</u>	<u>24,000</u>	<u>35,700</u>
<u>GBH</u>	<u>5,000</u>	<u>9,300</u>	<u>6,720</u>

9. Purple Loosestrife: Large clusters of loosestrife throughout the pool.

## Darby - Pool 1

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels deviated from the planned levels during the summer months. Water levels were kept high to discourage purple loosestrife and Phragmites.

#### Results:

Water not choked with spatterdock, pickerel weed or lotus was full of submerged aquatics (canals and east end). Rose mallow, purple loosestrife, and Phragmites continued to be a problem in the unit. Waterfowl use (Wood ducks especially) was steady throughout the year.

#### Facilities:

All but the east dike have slight to moderate erosion.

#### Costs:

All dikes were mowed once in 1989. 30 gallons of Rodeo solution was used to spray loosestrife and Phragmites in the pool. This included some time on the new airboat.

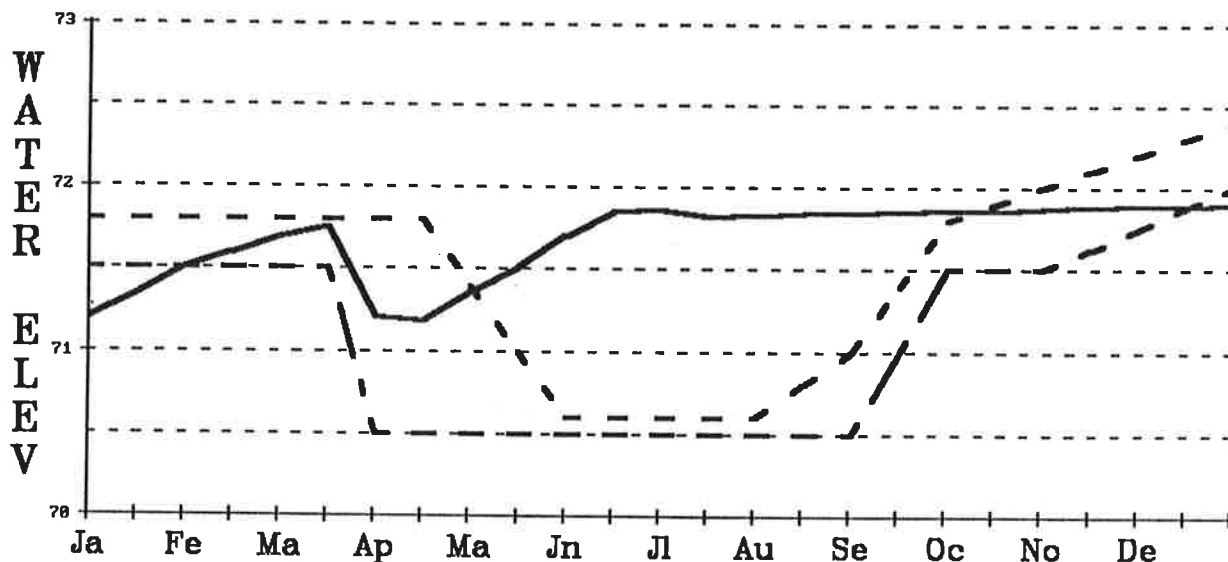
### B.2 Objectives of 1990 Proposed Water Levels

Maintain moderate levels during nesting season. Lower level in midsummer to encourage submergents and emmergents. Raise level in the fall for waterfowl use.

1. Unit Darby - Pool 2
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
- 90% bottom exposed -

### DARBY - POOL 2

— Actual  
 -- 89 Plan  
 - - 90 Plan



#### 7. Vegetation:

Species	Month		
	1987	1988	1989
Open Water/Submergents	25	15	30
Cattail	10	5	20
Pickerel Weed	55	5	30
Other (Inc. Purple Loosestrife)	10	10	10
Smartweed/Millet/Nutsedge		65	10

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
Ducks	5,500	6,000	6,100
Geese	100	1,000	850
GBH	850	2,000	1,500

#### 9. Purple Loosestrife: Scattered plants.

## Darby - Pool 2

### A.2 Effects of Past Year's Levels

#### Levels:

Construction in the adjacent ditch made it impossible to adhere to the planned drawdown. Levels mostly were stable.

#### Results:

Purple loosestrife infestation remaining stable despite efforts to control it.

#### Facilities:

Dikes along the west and south sides are in good shape. The banks of the north and east dikes are eroded and without rip-rap protection. The culvert of the water control structure was replaced in 1989. Work on the north dike will be complete in early 1990. A coffer dam is still in place in front of the water control structure preventing water from moving in or out of the pool. The water level gauge was removed during placement of the water control structure. A new one is needed and will be placed after construction is completed.

#### Costs:

Dikes were mowed once. The culvert and screw gate were replaced by the refuge staff. Construction on dikes and pump station, which will aid in water manipulation in Pools 2, 3, and 4, will be continuing through 1990. In the Darby Dike contract \$ 281,470.66 out of \$ 399,966.06 has been paid. \$ 399,966.06 of the Darby Pump Station contract has been paid (total contract price of \$ 185,816.00). Fifteen gallons of Rodeo solution was used to spray the unit.

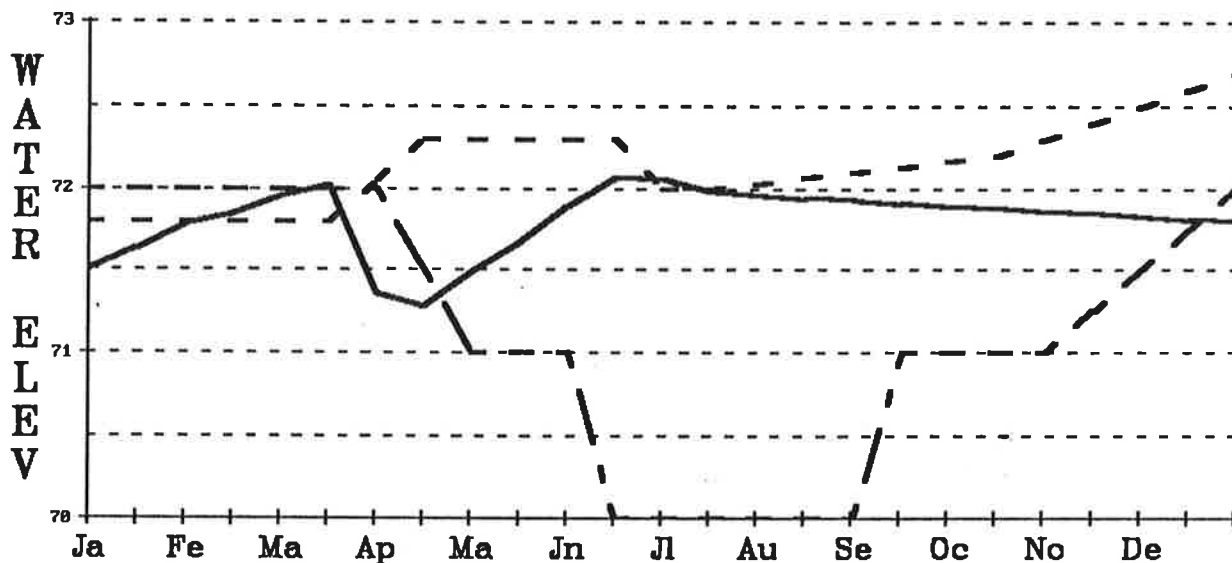
### B.2 Objectives of 1990 Proposed Water Levels

Maintain current water level through nesting then drawdown the pool to encourage moist soil plants. Water should be gradually increased for fall migration.

1. Unit Darby - Pool 3
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Water Elev. with 50% bottom exposed - 570
- 90% bottom exposed -

### DARBY - POOL 3

— Actual  
 -- 89 Plan  
 - - 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Open Water</u>	<u>98</u>	<u>30</u>	<u>30</u>
<u>Aquatic Smartweed</u>	<u>0</u>	<u>0</u>	<u>10</u>
<u>Smartweed/Millet/Nutsedge</u>	<u>          </u>	<u>65</u>	<u>5</u>
<u>Other</u>	<u>2</u>	<u>15</u>	<u>15</u>
<u>Pickerel Weed</u>	<u>          </u>	<u>          </u>	<u>40</u>

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>1,050</u>	<u>35,600</u>	<u>25,470</u>
<u>Geese</u>	<u>100</u>	<u>5,500</u>	<u>1,500</u>
<u>GBH</u>	<u>450</u>	<u>1,300</u>	<u>800</u>

9. Purple Loosestrife: Found plants throughout the pool especially along the southern edge.

## Darby - Pool 3

### A.2 Effects of Past Year's Levels

#### Levels:

Construction in the adjacent ditch made it impossible to adhere to the planned drawdown. Levels were mostly stable.

#### Results:

Pickereel weed dominated the unit. Loosestrife continues to spread although not evident from the dikes. It is intermixed within the cattail.

#### Facilities:

The north, east and west dikes are eroded on both sides and need resloping and rip rap protection. The water control structure was replaced in 1989 and work continues on the north dike/ditch. A coffer dam is preventing water from moving in or out of the unit. The water level gauge was removed during replacement of the water control structure.

#### Costs:

Dikes were mowed once. The culvert and screw gate were replaced by the refuge staff. Construction on dikes and pump station, which will aid in water manipulation in Pools 2, 3, and 4, will be continuing through 1990. Seventeen gallons of Rodeo solution and the airboat were used to spray the unit.

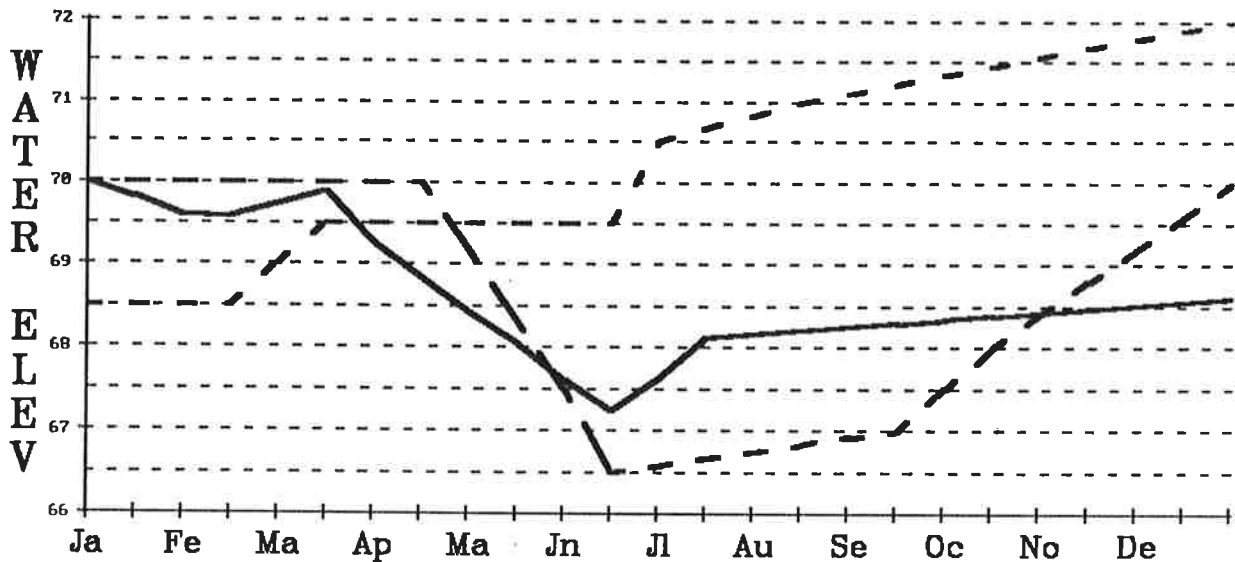
### B.2 Objectives of 1990 Proposed Water Levels

Once the water control structure and new pumping station are functional the pool water level should be kept relatively high to discourage spread of purple loosestrife.

1. Unit Darby - Pool 4
2. Acres 170
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 566.6
5. Water Elev. with 50% bottom exposed - 567.5
- 90% bottom exposed -

### DARBY - POOL 4

— Actual  
 -- 89 Plan  
 -- 90 Plan



#### 7. Vegetation:

Species	Month		
	%1987	%1988	%1989
<u>Open Water</u>	<u>91</u>	<u>61</u>	<u>75</u>
<u>Floating emergents</u>	<u>&lt;1</u>	<u>&lt;1</u>	<u>1</u>
<u>Cattail</u>	<u>1</u>	<u>1</u>	<u>5</u>
<u>Cottonwood/Willow</u>	<u>5</u>	<u>7</u>	<u>10</u>
<u>Other</u>	<u>2</u>	<u>6</u>	<u>4</u>
<u>Smartweed/Millet/Nutsedge</u>	<u>          </u>	<u>25</u>	<u>5</u>

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
<u>Ducks</u>	<u>25,000</u>	<u>136,000</u>	<u>53,486</u>
<u>Geese</u>	<u>1,200</u>	<u>23,000</u>	<u>28,600</u>
<u>GBH</u>	<u>500</u>	<u>5,200</u>	<u>3,000</u>

9. Purple Loosestrife: Scattered plants especially along the dikes, southwest corner, and southeast corner.

## Darby - Pool 4

### A.2 Effects of Past Year's Water Levels

#### Levels:

The although pool water levels were kept relatively low during the year the pool was dominated by water cover.

#### Results:

The pool edges developed stands of nutsedge, millet and smartweeds. Water quality should improve next year with reduction in wind and wave action and in the number of carp. The area was used by a variety of diving and dabbling ducks in the fall and winter.

#### Facilities:

The west and south dikes are slightly eroded but still in fair condition. The water control structure on the south side needs a new boardwalk. A new water control structure was placed on the west dike. A water level gauge is needed for this pool.

#### Costs:

All dikes were mowed once. A water control structure was placed in the west dike of the unit. This was included in the cost of the Darby Dike contract. Purple loosestrife in the unit was sprayed with a total of 39 gallons of Rodeo solution.

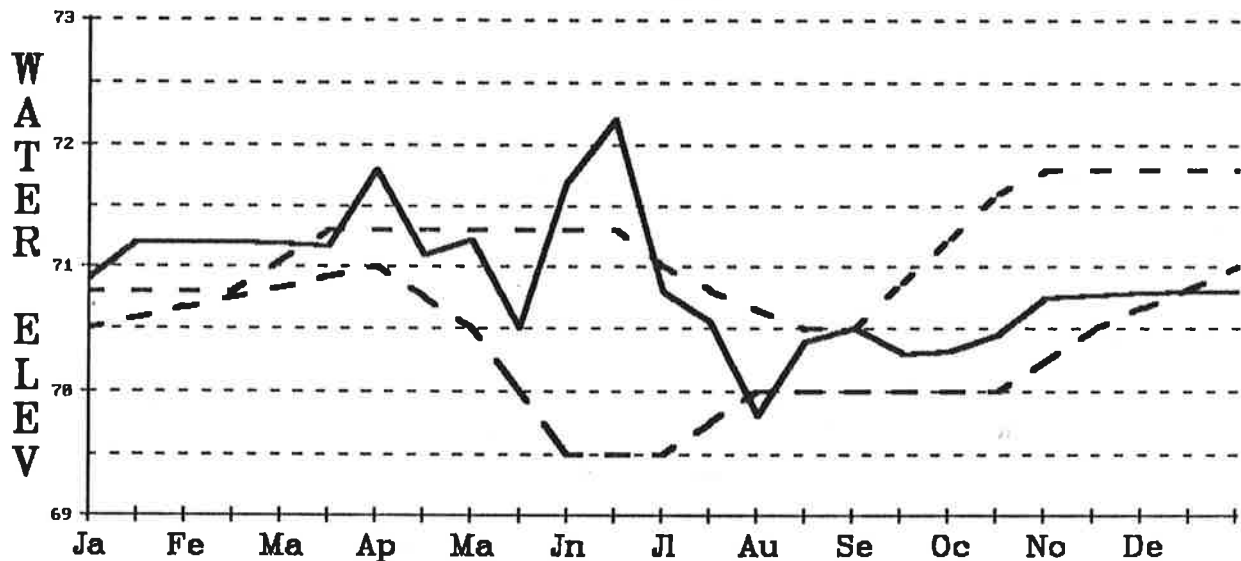
### B.2 Objectives of 1990 Proposed Water Levels

Once construction is complete, allow pool to drain until moist to encourage emergents. Then increase water level in the fall for waterfowl use.

1. Unit Navarre - Pool 1
2. Acres 130
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569.5
5. Water Elev. with 50% bottom exposed - 568.5
- 90% bottom exposed -

### NAVARRE - POOL 1

— Actual  
 -- 89 Plan  
 -- 90 Plan



#### 7. Vegetation:

Species	%1987	%1988	%1989
Open Water/Water Lily	45	40	30
Cattail	30	20	30
Bulrush/Burreed	10	5	5
Cottonwood/Willow	10	10	10
Other	5	5	5
Smartweed/Millet		20	10
Submergents			10

#### 8. Wildlife Use:

	Use Days		
	1987	1988	1989
Ducks	47,000	131,000	81,500
Geese	38,000	107,000	58,600
GBH	6,000	5,600	5,000

9. Purple Loosestrife: Fourteen plants located in Pool 1.

## Navarre - Pool 1

### A.2 Effects of Past Year's Water Levels

#### Levels:

Water levels generally followed the water management plan for the year. Problems in keeping with the plan evolved when the pumps malfunctioned in June.

#### Results:

Cattail and submergents dominated the unit.

#### Facilities:

Boundary signs were placed on the outer dikes this year.

#### Costs:

All pumping costs were paid by Toledo Edison. Fourteen purple loosestrife plants were sprayed with a total of 2 gallons of Rodeo solution.

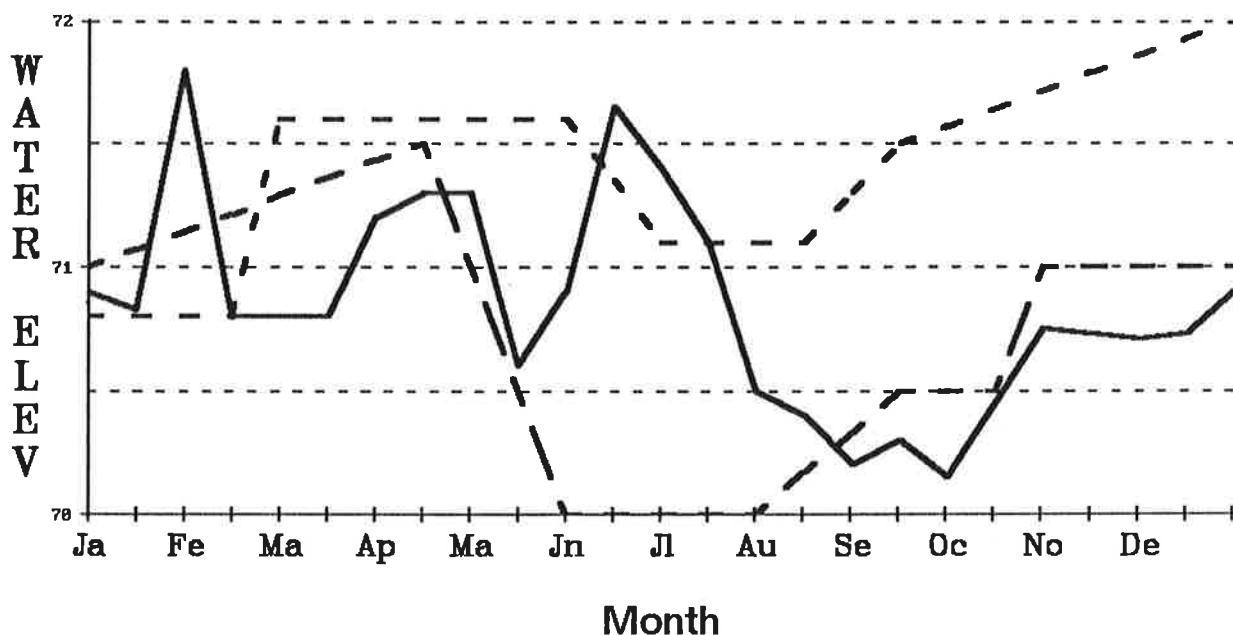
### B.2 Objectives of 1990 Proposed Water Levels

Maintain water levels through out nesting season. Then decrease water levels to encourage emergents. During waterfowl migration water levels should be increased.

1. Unit Navarre - Pool 2
2. Acres 340
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569.5
5. Water Elev. with 50% bottom exposed - 569.5  
90% bottom exposed -

## NAVARRE - POOL 2

— Actual  
-- 89 Plan  
.. 90 Plan



### 7. Vegetation:

Species	%1987	%1988	%1989
<u>Cattail</u>	<u>40</u>	<u>25</u>	<u>30</u>
<u>Bulrush</u>	<u>10</u>	<u>10</u>	<u>10</u>
<u>Burreed</u>	<u>5</u>	<u>5</u>	<u>5</u>
<u>Water Lily/Lotus/Submerged</u>	<u>30</u>	<u>30</u>	<u>20</u>
<u>Other (Bluejoint, mallow, etc.)</u>	<u>15</u>	<u>15</u>	<u>10</u>
<u>Smartweed/Millet</u>	<u>          </u>	<u>15</u>	<u>5</u>
<u>Open Water</u>	<u>          </u>	<u>          </u>	<u>20</u>

### 8. Wildlife Use:

	1987	1988	1989
<u>Ducks</u>	<u>120,000</u>	<u>240,000</u>	<u>180,000</u>
<u>Geese</u>	<u>121,000</u>	<u>135,500</u>	<u>120,500</u>
<u>GBH</u>	<u>12,000</u>	<u>9,000</u>	<u>8,000</u>

### 9. Purple Loosestrife: Eight plants.

## Navarre - Pool 2

### A.2 Effects of Past Year's Water Levels

#### Levels:

Large fluctuations in water levels were due to the movement of water from the discharge and malfunctions of the pumps.

#### Results:

Cattail and water lily dominated the unit. Other higher areas had good growth of submergents and emergents. Southern portions were wet meadow habitat.

#### Facilities:

Boundary signs, maintained by the refuge, were placed on the outer dikes.

#### Costs:

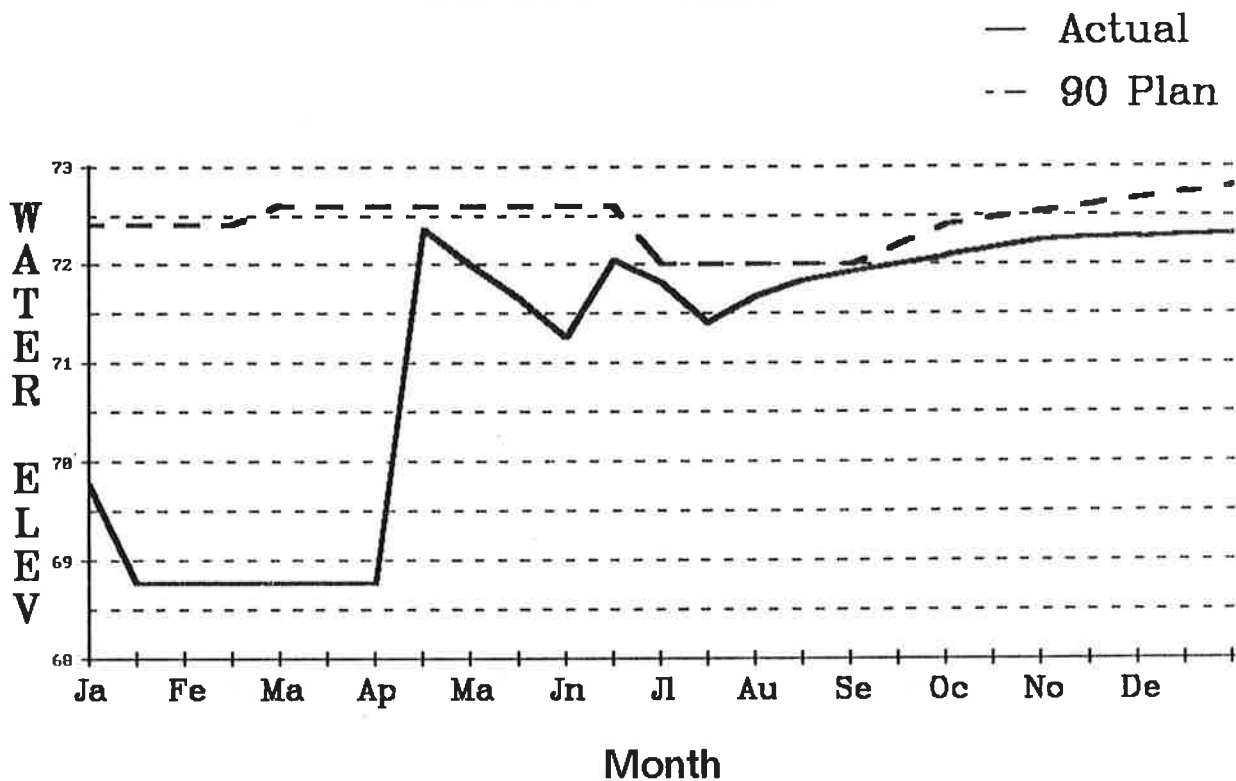
All pumping costs were covered by Toledo Edison. Seven purple loosestrife plants were sprayed with a total of 1 gallon of Rodeo solution.

### B.2 Objectives of 1990 Proposed Water Levels

Water levels should be maintained during nesting season and kept high to open up the cattail. Some water should be taken off in the summer to increase invertebrates. Then water should be added for fall migration.

1. Unit Navarre - Pool 3
2. Acres 188
3. Maximum elevation permissible unknown
4. Flowline elevation of lowest structure unknown
5. Water Elev. with 50% bottom exposed - " "
- 90% bottom exposed -

### NAVARRE - POOL 3



#### 7. Vegetation:

Species	%1987	%1988	%1989
Open Water	97	0	20
Smartweed		98	20
Willow/Cottonwood/Sumac	3	3	5
Bulrush			40
Submergents			15

#### 8. Wildlife Use:

	1987	Use Days 1988	1989
Ducks	unknown	19,200	32,500
Geese		4,000	6,400
GBH		1,200	1,500

#### 9. Purple Loosestrife: Nine plants.

## Navarre - Pool 3

### A.2 Effects of Past Year's Water Levels

#### Levels:

The graph shown for this unit is actual readings beginning in April. A management plan was not given to Toledo Edison for this pool in 1989. Several times we tried to manipulate the pool but were informed that it would back up the sewer discharge of the Davis Besse plant. Water levels were generally 6" to 8" above the pool bottom.

#### Results:

Bulrush and cattail sprouts were observed through out the pool. Aquatic smartweed also developed. Many Coots used the pool for nesting.

#### Facilities:

Only boundary signs are maintained by the refuge. Signs were placed along the outer dikes. The environmental section of Davis Besse has ordered flap gates for the interior side of the structure so prevent water from flowing out when the lake is low. The flap gate will be installed in early 1990.

#### Costs:

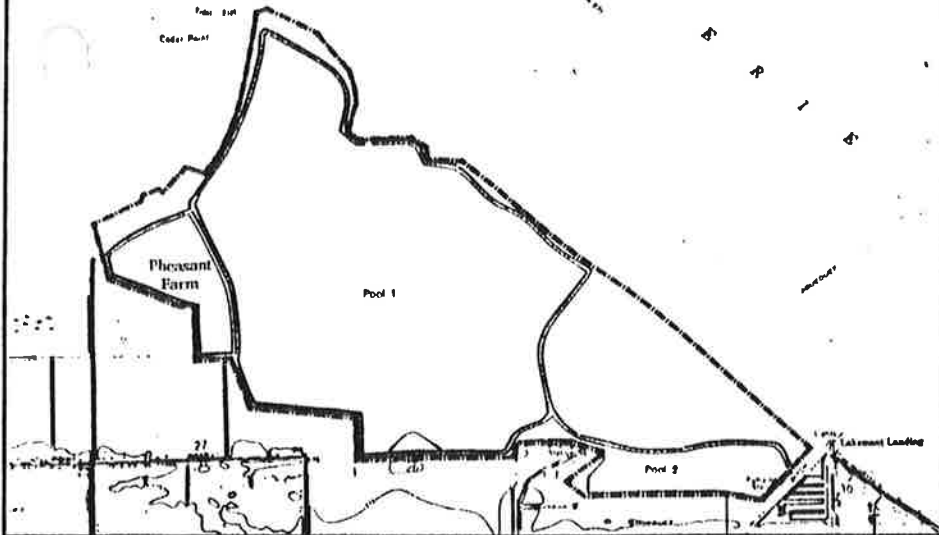
All pumping costs and the flap gate costs were covered by Toledo Edison. Eleven plants were sprayed with 2 gallons of Rodeo solution for purple loosestrife control.

### B.2 Objectives of 1990 Proposed Water Levels

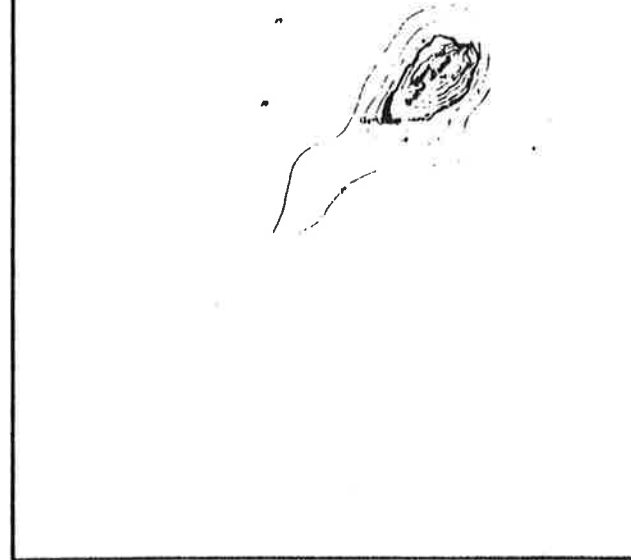
Water levels should be raised slightly before nesting season. Then kept constant during nesting. A small amount of water should be released midsummer to encourage emmergents. Then water levels should be raised for fall migration.



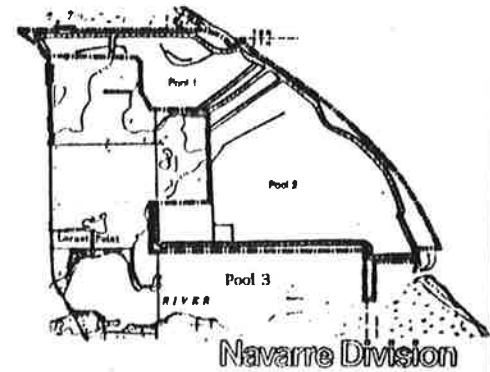
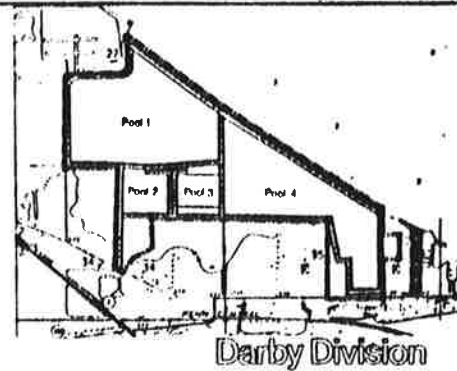
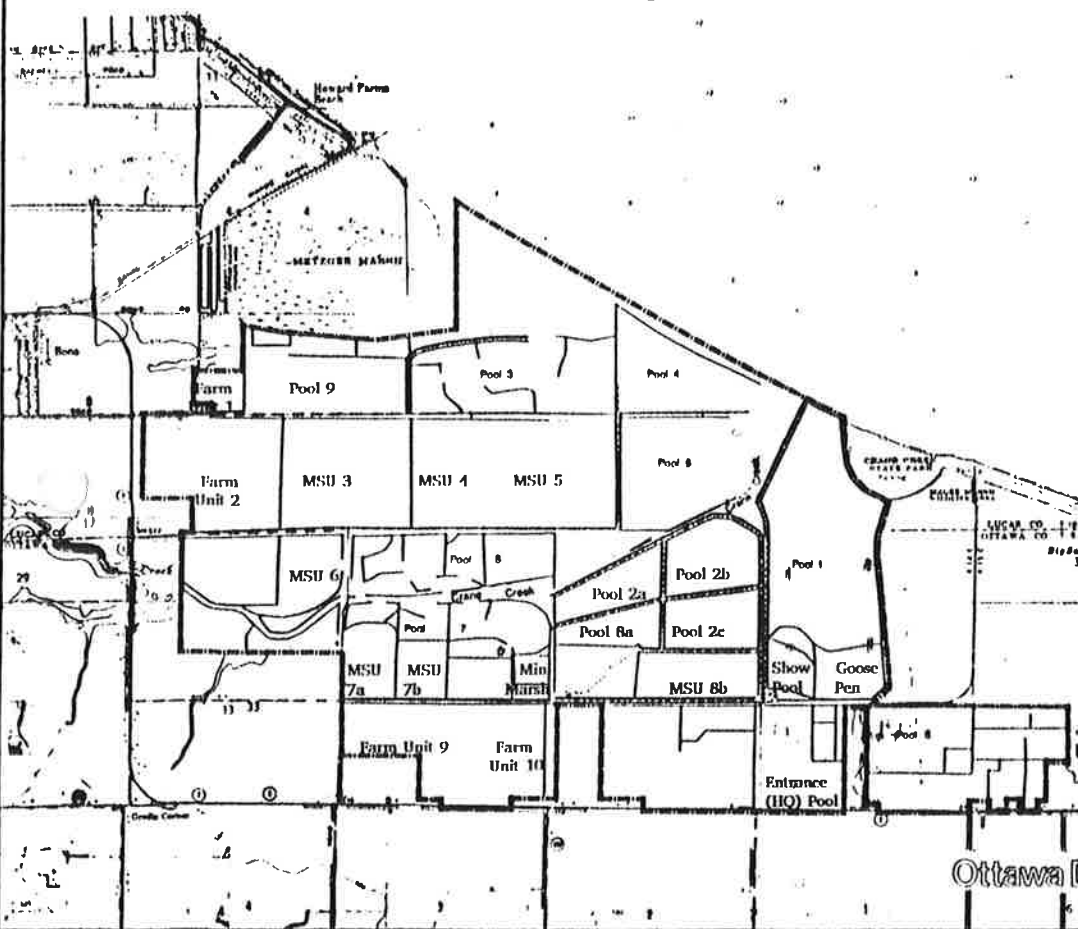
## Cedar Point National Wildlife Refuge



## West Sister Island National Wildlife Refuge



## Ottawa National Wildlife Refuge



Ottawa Division

# OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

Oak Harbor, Ohio

## Base Map



